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Report to Congress

Implementation and Enforcement of the Combined Sewer Overflow Control Policy

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List of Acronyms

6MM—Six Minimum Measures

AMSA—Association of Metropolitan Sewerage Authorities

AO—Administrative Order

APWA—American Public Works Association

BAT—Best Available Technology Economically Achievable

BCT—Best Conventional Pollutant Control Technology

BEACH Program—Beaches Environmental Assessment, Closure and Health Program

BMP—Best Management Practice

BPJ—Best Professional Judgement

CAPD—Compliance Assistance Planning Database

CIP—Capital Improvement Plan

CMC—Center for Marine Conservation

CSO—Combined Sewer Overflow

CSS—Combined Sewer Systems

CWA—Clean Water Act

CWNS—Clean Water Needs Survey

DEM—Department of Environmental Management

DEP—Department of Environmental Protection

EBPS—Environmental Benefit Permit Strategy

EPA—Environmental Protection Agency

ERPs—Regional Enforcement Response Plans

FOIA—Freedom of Information Act

GPRA—Government Performance and Results Act

IEPA—Illinois Environmental Protection Agency

LGEAN—Local Government Environmental Assistance Network

LTCP—Long-Term Control Plan

MAG—Office of Water Management Advisory Group

mgd—Million Gallons per Day

MHI—Median Household Income

MOA—Memorandum of Agreement

MS4s—Municipal Separate Storm Sewer Systems

MSD—Metropolitan Sewer District

MWRA—Massachusetts Water Resources Authority

MWRD—Metropolitan Water Reclamation District

NEORSD—Northeast Ohio Regional Sewer District

NEPPS—National Environmental Performance Partnership System

NMC—Nine Minimum Controls

NMP—National Municipal Policy

NOAA—National Oceanic and Atmospheric Administration

NOV—Notices of Violation

NPDES—National Pollutant Discharge Elimination System

NRDC—Natural Resources Defense Council

NYCDEP—New York City's Department of Environmental Protection

O & M—Operation and Maintenance

OECA—Office of Enforcement and Compliance Assurance

OGWDW—Office of Ground Water and Drinking Water

ORD—Office of Research and Development

OW—Office of Water

OWM—Office of Wastewater Management

OWOW—Office of Wetlands, Oceans and Watersheds

PCS—Permit Compliance System

POTW—Publicly Owned Treatment Works

PPA—Performance Partnership Agreement

RCATS—Reporting Compliance Assistance System

SCSs—Satellite Collection Systems

SEA—Senate Enrolled Act

SRF—State Revolving Fund

SSES—Sewer System Evaluation Study

SSO—Sanitary Sewer Overflow

SWAP—Source Water Assessment Program

TARP—Tunnel and Reservoir Plan

TMDL—Total Maximum Daily Loads

TOGS—Technical and Operational Guidance Series

UAA—Use Attainability Analysis

USDA—United States Department of Agriculture

WEF—Water Environment Federation

WPD—Water Permits Division

WWTP—Wastewater Treatment Plants

Glossary

This glossary includes a collection of the terms used in this manual and an explanation of each term. To the extent that definitions and explanations provided in this glossary differ from those in EPA regulations or other official documents, they are intended for use in understanding this manual only.

A

Anti-backsliding—A provision in the Federal Regulations [CWA §303(d)(4); CWA §402(c); CFR §122.44(l)] that requires a reissued permit to be as stringent as the previous permit with some exceptions.

Antidegradation—Policies which ensure protection of water quality for a particular water body where the water quality exceeds levels necessary to protect fish and wildlife propagation and recreation on and in the water. This also includes special protection of waters designated as outstanding natural resource waters. Antidegradation plans are adopted by each state to minimize adverse effects on water.

Authorized Program or Authorized State—A state, territorial, tribal, or interstate NPDES program which has been approved or authorized by EPA under 40 CFR Part 123.

Average Number of Overflow Events Per Year—The total number of combined sewer overflow events that occurred during the term of the permit divided by the permit term in years.

B

Best Available Technology Economically Achievable (BAT)—Technology-based standard established by the Clean Water Act (CWA) as the most appropriate means available on a national basis for controlling the direct discharge of toxic and nonconventional pollutants to navigable waters. BAT effluent limitations guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.

Best Conventional Pollutant Control Technology (BCT)—Technology-based standard for the discharge from existing industrial point sources of conventional pollutants including BOD, TSS, fecal coliform, pH, oil and grease. The BCT is established in light of a two-part "cost reasonableness" test which compares the cost for an industry to reduce its pollutant discharge with the cost to a POTW for similar levels of reduction of a pollutant loading. The second test examines the cost-effectiveness of additional industrial treatment beyond BPT. EPA must find limits which are reasonable under both tests before establishing them as BCT.

Best Management Practice (BMP)—Permit condition used in place of or in conjunction with effluent limitations to prevent or control the discharge of pollutants. May include schedule of activities, prohibition of practices, maintenance procedure, or other management practice. BMPs may include, but are not limited to, treatment requirements, operating procedures, or practices to control plant site runoff, spillage, leaks, sludge or waste disposal, or drainage from raw material storage.

Best Professional Judgment (BPJ)—The method used by permit writers to develop technology-based NPDES permit conditions on a case-by-case basis using all reasonably available and relevant data.

BOD5—Five-day biochemical oxygen demand; a standard measure of the organic content of wastewater, expressed in mg/l.

Biochemical Oxygen Demand (BOD)—A measurement of the amount of oxygen utilized by the decomposition of organic material, over a specified time period (usually 5 days) in a wastewater sample; it is used as a measurement of the readily decomposable organic content of a wastewater.

Bypass—The intentional diversion of wastestreams from any portion of a treatment (or pretreatment) facility.

C

Catch Basin—A chamber usually built at the curbline of a street, which admits surface water for discharge into a storm drain.

Clean Water Act (CWA)—The Clean Water Act is an act passed by the U.S. Congress to control water pollution. It was formerly referred to as the Federal Water Pollution Control Act of 1972 or Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), 33 U.S.C. 1251 et. seq., as amended by: Public Law 96-483; Public Law 97-117; Public Laws 95-217, 97-117, 97-440, and 100-04.

Code of Federal Regulations (CFR)—A codification of the final rules published daily in the Federal Register. Title 40 of the CFR contains the environmental regulations.

Collector Sewer—The first element of a wastewater collection system used to collect and carry wastewater from one or more building sewers to a main sewer. Also called a lateral sewer.

Combined Sewage—Wastewater and storm drainage carried in the same pipe.

Combined Sewer Overflow (CSO)—A discharge of untreated wastewater from a combined sewer system at a point prior to the headworks of a publicly owned treatment works. CSOs generally occur during wet weather (rainfall or snowmelt). During periods of wet weather, these systems become overloaded, bypass treatment works, and discharge directly to receiving waters.

Combined Sewer System (CSS)—A wastewater collection system which conveys sanitary wastewaters (domestic, commercial and industrial wastewaters) and storm water through a single pipe to a publicly owned treatment works for treatment prior to discharge to surface waters.

Compliance Schedule—A schedule of remedial measures included in a permit or an enforcement order, including a sequence of interim requirements (for example, actions, operations, or milestone events) that lead to compliance with the CWA and regulations.

Criteria—The numeric values and the narrative standards that represent contaminant concentrations that are not to be exceeded in the receiving environmental media (surface water, ground water, sediment) to protect beneficial uses.

D

Designated use—Use specified in WQS for each water body or segment whether or not it is being attained.

Director—The Regional Administrator or State Director, as the context requires, or an authorized representative. When there is no approved state program, and there is an EPA administered program, Director means the Regional Administrator. When there is an approved state program, “Director” normally means the State Director.

Discharge Monitoring Report (DMR)—The form used (including any subsequent additions, revisions, or modifications) to report self-monitoring results by NPDES permittees. DMRs must be used by approved states as well as by EPA.

Draft Permit—A document prepared under 40 CFR §124.6 indicating the Director's tentative decision to issue, deny, modify, revoke and reissue, terminate, or reissue a permit. A notice of intent to terminate a permit, and a notice of intent to deny a permit application, as discussed in 40 CFR §124.5, are considered draft permits. A denial of a request for modification, revocation and reissuance, or termination, as discussed in 40 CFR §124.5, is not a draft permit.

Dry Weather Flow Conditions—Hydraulic flow conditions within the combined sewer system resulting from one or more of the following: flows of domestic sewage, ground water infiltration, commercial and industrial wastewaters, and any other non-precipitation event related flows (e.g., tidal infiltration under certain circumstances). Other non-precipitation event related flows that are included in dry weather flow conditions will be decided by the permit writer based on site-specific conditions.

Dry Weather Flow Overflow—A combined sewer overflow that occurs during dry weather flow conditions.

E

Effluent Limitation—Any restriction imposed by the Director on quantities, discharge rates, and concentrations of pollutants which are discharged from point sources into waters of the United states, the waters of the contiguous zone, or the ocean.

G

General Permit—An NPDES permit issued under 40 CFR §122.28 that authorizes a category of discharges under the CWA within a geographical area. A general permit is not specifically tailored for an individual discharger.

I

Indirect Discharge—The introduction of pollutants into a municipal sewage treatment system from any nondomestic source (i.e., any industrial or commercial facility) regulated under Section 307(b), (c), or (d) of the CWA.

Infiltration—Water other that wastewater that enters a wastewater system and building sewers from the ground through such means as defective pipes, pipe joints, connections, or manholes. (Infiltration does not include inflow).

Infiltration/Inflow (I/I) —The total quantity of water from both infiltration and inflow.

Inflow—Water other than wastewater that enters a wastewater system and building sewer from sources such as roof leaders, cellar drains, yard drains, area drains, foundation drains, drains from springs and swampy areas, manhole covers, cross connections between storm drains and sanitary sewers, catch basins, cooling towers, stormwaters, surface runoff, street wash waters, or drainage. (Inflow does not include infiltration).

Interceptor Sewer—A sewer without building sewer connections which is used to collect and carry flows from main and trunk sewers to a central point for treatment and discharge.

L

Load Allocation (LA) —The portion of a receiving water's loading capacity that is attributed to one of its existing or future nonpoint sources of pollution, or to natural background sources.

M

Major Facility—Any NPDES facility or activity classified as such by the Regional Administrator, or in the case of approved state programs, the Regional Administrator in conjunction with the State Director. Major municipal dischargers include all facilities with design flows of greater than one million gallons per day and facilities with EPA/state approved industrial pretreatment programs. Major industrial facilities are determined based on specific ratings criteria developed by EPA/state.

Million Gallons per Day (mgd)—A unit of flow commonly used for wastewater discharges. One mgd is equivalent to 1.547 cubic feet per second.

Mixing Zone—An area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient water body. A mixing zone is an allocated impact zone where water quality criteria can be exceeded as long as acutely toxic conditions are prevented.

N

National Pollutant Discharge Elimination System (NPDES)—The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of CWA.

National Pretreatment Standard or Pretreatment Standard—Any regulation promulgated by the EPA in accordance with Sections 307(b) and (c) of the CWA that applies to a specific category of industrial users and provides limitations on the introduction of pollutants into publicly owned treatment works. This term includes the prohibited discharge standards under 40 CFR §403.5, including local limits [40 CFR §403.3(j)].

O

Overflow Rate—Detention basin release rate divided by the surface area of the basin. It can be thought of as an average flow rate through the basin. Generally expressed as gallons per day per sq. ft. (gpd/sq.ft.).

P

Peak Flow—The maximum flow that occurs over a specific length of time (e.g., daily, hourly, instantaneous).

Point Source—Any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fixture, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged.

Pollutant—Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.

Precipitation Event—An occurrence of rain, snow, sleet, hail, or other form of precipitation. Precipitation events are generally characterized by parameters of duration and intensity (inches or millimeters per unit of time). This definition will be highly site-specific. For example, a precipitation event could be defined as 0.25 inches or more of precipitation in the form of rain or 3 inches or more of precipitation in the form of sleet or snow, reported during the preceding 24-hour period at a specific gaging station. A precipitation event could also be defined by a minimum time interval between measurable amounts of precipitation (e.g., 6 hours between the end of rainfall and the beginning of the next rainfall).

Pretreatment—The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a publicly owned treatment works [40 CFR §403.3(q)].

Primary Clarification or Equivalent—The level of treatment that would typically be provided by one or more treatment technologies under peak wet weather flow conditions. Options for defining primary clarification include a design standard (e.g., side wall depth and maximum overflow rate), a performance standard (e.g., percent removal), or an effluent standard (e.g., concentration of pollutants). "Equivalent to primary clarification" is site-specific and includes any single technology or combination of technologies shown by the permittee to achieve primary clarification under the presumption approach. The permittee is responsible for showing equivalency to primary treatment as part of the evaluation of CSO control alternatives during LTCP development. Primary clarification is discussed in more detail in the Combined Sewer Overflows-Guidance for Long-Term Control Plan (EPA, 1995a).

Primary Treatment—The practice of removing some portion of the suspended solids and organic matter in a wastewater through sedimentation. Common usage of this term also includes preliminary treatment to remove wastewater constituents that may cause maintenance or operational problems in the system (i.e., grit removal, screening for rags and debris, oil and grease removal, etc.).

Publicly Owned Treatment Works (POTW)—A treatment works, as defined by Section 212 of the CWA, that is owned by the state or municipality. This definition includes any devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes, and other conveyances only if they convey wastewater to a POTW treatment plant [40 CFR §403.3].

R

Rainfall Duration—The length of time of a rainfall event.

Rainfall Intensity—The amount of rainfall occurring in a unit of time, usually expressed in inches per hour.

Regulator—A device in combined sewer systems for diverting wet weather flows which exceed downstream capacity to an overflow.

S

Sanitary Sewer—A pipe or conduit (sewer) intended to carry wastewater or water-borne wastes from homes, businesses, and industries to the POTW.

Sanitary Sewer Overflows (SSO)—Untreated or partially treated sewage overflows from a sanitary sewer collection system.

Secondary Treatment—Technology-based requirements for direct discharging municipal sewage treatment facilities. Standard is based on a combination of physical and biological processes typical for the treatment of pollutants in municipal sewage. Standards are expressed as a minimum level of effluent quality in terms of:BOD5, suspended solids (SS), and pH (except as provided for special considerations and treatment equivalent to secondary treatment).

Sensitive Areas—Areas of particular environmental significance or sensitivity that could be adversely affected by a combined sewer overflow, including Outstanding National Resource Waters, National Marine Sanctuaries, water with threatened or endangered species, waters with primary contact recreation, public drinking water intakes, shellfish beds, and other areas identified by the permittee or National Pollutant Discharge Elimination System permitting authority, in coordination with the appropriate state or federal agencies.

Solid and Floatable Materials—Solid or semi-solid materials should be defined on a case-by-case basis determined by the control technologies proposed by the permittee to control these materials. The term generally includes materials that might impair the aesthetics of the receiving water body.

State Revolving Fund Program—A federal program created by the Clean Water Act Amendments in 1987 that offers low interest loans for wastewater treatment projects.

STORET—EPA's computerized STOrage and RETrieval water quality database that includes physical, chemical, and biological data measured in waterbodies throughout the United States.

Storm Water—Storm water runoff, snow melt runoff, and surface runoff and drainage [40 CFR §122.26(b)(13)].

T

Total Maximum Daily Load (TMDL)—The amount of pollutant, or property of a pollutant, from point, nonpoint, and natural background sources, that may be discharged to a water quality-limited receiving water. Any pollutant loading above the TMDL results in violation of applicable water quality standards.

Total Suspended Solids (TSS)—A measure of the filterable solids present in a sample, as determined by the method specified in 40 CFR Part 136.

V

Variance—Any mechanism or provision under Sections 301 or 316 of the CWA or under 40 CWR Part 125, or in the applicable "effluent limitations guidelines" which allows modification to or waiver of the generally applicable effluent limitations requirements or time deadlines of the CWA. This includes provisions, which allow the establishment of alternative limitations based on fundamentally different factors.

W

Wasteload Allocation (WLA)—The proportion of a receiving water's total maximum daily load that is allocated to one of its existing or future point sources of pollution.

Water Quality Criteria—Comprised of numeric and narrative criteria. Numeric criteria are scientifically derived ambient concentrations developed by EPA or states for various pollutants of concern to protect human health and aquatic life. Narrative criteria are statements that describe the desired water quality goal.

Water Quality Standard (WQS)—A law or regulation that consists of the beneficial use or uses of a waterbody, the numeric and narrative water quality criteria that are necessary to protect the use or uses of that particular waterbody, and an antidegradation statement.

Waters of the United States-All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters subject to the ebb and flow of the tide. Waters of the United States include but are not limited to all interstate waters and intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, play lakes, or natural ponds. [See 40 CFR §122.2 for the complete definition.]

Wet Weather Flow—Dry weather flow combined with stormwater introduced into a combined sewer, and dry weather flow combined with inflow in a separate sewer.

Wet Weather Flow Conditions—Hydraulic flow conditions within the combined sewer system resulting from a precipitation event. Since the definition of precipitation event is site-specific, the permit writer should evaluate and define certain site-specific weather conditions that typically contribute to wet weather flow. EPA encourages permit writers to include snowmelt as a condition that typically contributes to wet weather flow.

Executive Summary

Report to Congress on Implementation and Enforcement of the Combined Sewer Overflow Control Policy

In this chapter:

The U.S. Environmental Protection Agency (EPA or "the Agency") is transmitting this Report to Congress on the progress made by EPA, states, and municipalities in implementing and enforcing the Combined Sewer Overflow (CSO) Control Policy signed by the Administrator on April 11, 1994. This report is required by Section 402(q)(3) of the Clean Water Act (CWA).

Overview and Background

Why is EPA preparing this report?

In the Consolidated Appropriations Act for Fiscal Year 2001, P.L. 106-554 (or "2000 amendments to the CWA") Congress made several changes to the CWA regarding CSOs, including:

> *Section 402(q) Combined Sewer Overflows*
>
> *(3) Report.–Not later than September 1, 2001, the Administrator shall transmit to Congress a report on the progress made by EPA, states and municipalities in implementing and enforcing the CSO Control Policy.*

This Executive Summary provides an overview of this report and highlights report findings, key program challenges, and EPA actions and next steps to ensure effective implementation and enforcement of the CSO Control Policy.

What are CSOs, and why are they a problem?

As defined in the CSO Control Policy, a combined sewer system (CSS) is:

> *A wastewater collection system owned by a state or municipality (as defined by Section 502(4) of the CWA) which conveys sanitary wastewaters (domestic, commercial and industrial wastewaters) and storm water through a single-pipe system to a publicly owned treatment works (POTW)...*

Further, a CSO is defined as:

> *The discharge from a CSS at a point prior to the POTW...*

CSSs were among the earliest sewers built in the United States and continued to be built until the middle of the twentieth century. During precipitation events (e.g.,rainfall or snowmelt), the volume of sanitary wastewater and storm water runoff entering CSSs often exceeds conveyance capacity. Combined sewer systems are designed to overflow directly to surface waters when their design capacity is exceeded. Some CSOs occur infrequently; others, with every precipitation event. Because CSOs contain raw sewage and contribute pathogens, solids, debris, and toxic pollutants to receiving waters, CSOs can create serious public health and water quality concerns. CSOs have caused or contributed to beach closures, shellfish bed closures, contamination of drinking water supplies, and other environmental and public health problems.

What statutory and regulatory framework applies to CSOs?

The CWA establishes national goals and requirements for maintaining and restoring the nation's waters. As point sources, CSOs are subject to the technology- and water quality-based requirements of the CWA. They are not, however, subject to the secondary treatment standards that apply to POTWs.

In 1989, EPA initiated action to clarify requirements for CSOs through the publication of the National CSO Control Strategy (54 FR 37370, September 8, 1989). As a result, states developed—and EPA approved—state CSO strategies. In 1992, a management advisory group to EPA recommended that the Agency begin a dialogue with key stakeholders to better define the CWA expectations for controlling CSOs. A workgroup of CSO stakeholders was assembled during the summer of 1992. The workgroup achieved a negotiated dialogue that led to agreement on many technical issues, but no consensus on a policy framework. Individuals from the workgroup representing stakeholder groups met in October 1992 and developed a framework document for CSO control that served as the basis for portions of the draft CSO Control Policy issued for public comment in January 1993. With extensive and documented stakeholder support, EPA issued the final CSO Control Policy on April 19, 1994 (59 FR 18688). When the CSO Control Policy was released, many stakeholders, key members of Congress, and EPA advocated that it be endorsed in the CWA to ensure its full implementation.

In the Consolidated Appropriations Act for Fiscal Year 2001, P.L. 106-554, Congress also stated that:

> *...each permit, order or decree issued pursuant to this Act after the date of enactment of this subsection for a discharge from a municipal combined storm and sanitary sewer shall conform to the CSO Control Policy signed by the Administrator on April 11, 1994.*

In addition, Congress required preparation of 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.

What is the CSO Control Policy?

The CSO Control Policy "represents a comprehensive national strategy to ensure that municipalities, permitting authorities, water quality standards authorities and the public engage in a comprehensive and coordinated effort to achieve cost effective CSO controls that ultimately meet appropriate health and environmental objectives." In 1994, EPA estimated that the cost of CSO control, consistent with the CSO Control Policy, would be $40 billion. In the *1996 Clean Water Needs Survey Report to Congress* (EPA, 1997b), EPA estimated the cost to be $44.7 billion (1996 dollars).

The CSO Control Policy established four key principles to guide CSO planning decisions by municipalities, NPDES authorities, and water quality standards authorities:

1. Providing clear levels of control that would be presumed to meet appropriate health and environmental objectives.

2. Providing 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.

3. Allowing a phased approach to implementation of CSO controls considering a community's financial capability.

4. Reviewing and revising, 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 expected that NPDES permits or other enforceable mechanisms would require CSO communities to implement nine minimum technology-based controls (the "nine minimum controls" or NMC) by January 1, 1997, and to develop CSO long-term control plans (LTCPs). The LTCP must assess a range of control options, including costs and benefits, and lead to selection of an alternative that would achieve appropriate water quality objectives and compliance with the CWA. Once the NPDES authority and CSO community reached agreement on an LTCP, the CSO community would design and construct the CSO controls as soon as practicable.

What methodology did EPA use for this Report to Congress?

The basic study approach for this report 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. This entailed:

- Reviewing existing information in state and EPA permit and enforcement files, and federal data bases.
- Performing a literature search on policy, technology, and environmental data.
- Using modeling projections in certain cases.
- Conducting site visits to five EPA Regions and 16 states in which more than 90 percent of the nation's CSSs are located.
- Developing 15 CSO community case studies.
- Reviewing data from surveys conducted by the Association of Metropolitan Sewerage Agencies (AMSA) and the CSO Partnership.
- Organizing a stakeholder discussion of the preliminary issues and findings from the report at a meeting in Chicago, Illinois on July 12 and 13, 2001.

These efforts have allowed the Agency to compile a data base of all CSO permits, prepare profiles of all state CSO programs, and identify and document data gaps. The methodology for this Report to Congress recognizes that the Report to Congress required in 2003 will focus on the extent of environmental and human health impacts, resources spent, and an evaluation of technologies for CSO control.

Report Findings

What are the overall findings of this Report to Congress?

Progress has been made in implementing and enforcing CSO controls prior to, and as a result of, the 1994 CSO Control Policy. Cities that have made substantial progress and investments in CSO control are realizing public health and water quality benefits. The CSO Control Policy provides a sound approach to assess and implement cost effective CSO controls that meet appropriate environmental goals and objectives and achieve CWA compliance. It fosters and expects significant involvement of the public and the NPDES and water quality standards authorities.

Although federal, state, and municipal officials are involved in a broad range of activities to regulate and control CSOs, CSOs continue to pose a serious environmental and public health threat. Much remains to be done to fully realize the objectives of the CSO Control Policy and the CWA. The CSO Control Policy provides an appropriate framework for communities to control CSOs. EPA believes the codification of the CSO Control Policy through the 2000 amendments to the CWA will focus greater attention on implementation of the CSO Control Policy.

EPA believes a number of factors have affected the degree of implementation of the CSO Control Policy, including the lack of any statutory or regulatory endorsement of the CSO Control

Policy from 1994 until December 2000, and competing priorities at the federal, state and local level.

Below, EPA presents a summary of the key findings of this report, organized along four central themes. These themes are:

- A description of the status of CSOs in the United States.
- An overview of progress in implementing and enforcing the CSO Control Policy, examining key programmatic accomplishments at the federal and state levels, as well as municipal actions to implement the technology- and water quality-based controls.
- Early feedback on the nature and extent of environmental results stemming from CSO control.
- A review of remaining challenges in implementing and enforcing the CSO Control Policy.

What is the status of CSOs in the United States?

Today, there are 772 CSO communities with a total of 9,471 CSOs that are identified and regulated by 859 NPDES permits. Key attributes of the CSO universe include:

- CSSs are found in 32 states (including the District of Columbia) and nine EPA Regions. They are regionally concentrated in older communities in the Northeast and Great Lakes regions as shown in Figure ES.1.
- CSSs are diverse, varying in configuration, size, age, number and location of outfalls. For example:
    - Prior to CSO control, San Francisco estimated that CSO discharges from 43 combined sewer outfalls occurred approximately 58 times per year, with a total annual overflow volume of 7.5 billion gallons, discharging into Islais Creek, San Francisco Bay, and the Pacific Ocean. As a result of its CSO control program, San Francisco has eliminated seven outfalls and reduced total annual overflow volume by more than 80 percent.
    - In Bremerton, WA, prior to initiation of CSO control, the average annual CSO volume was more than 120 million gallons from 16 CSOs discharging into Puget Sound. As part of its CSO control program, Bremerton has eliminated three outfalls and reduced total annual overflow volume by nearly 70 percent.
- Of the 772 CSO communities, approximately 30 percent have populations greater than 75,000, and approximately 30 percent are very small with total service populations of less than 10,000.
- EPA estimated in 1978 that there were as many as 1,300 CSO communities. Differences with today's 772 CSO communities are primarily attributable to the improved inventory of CSO

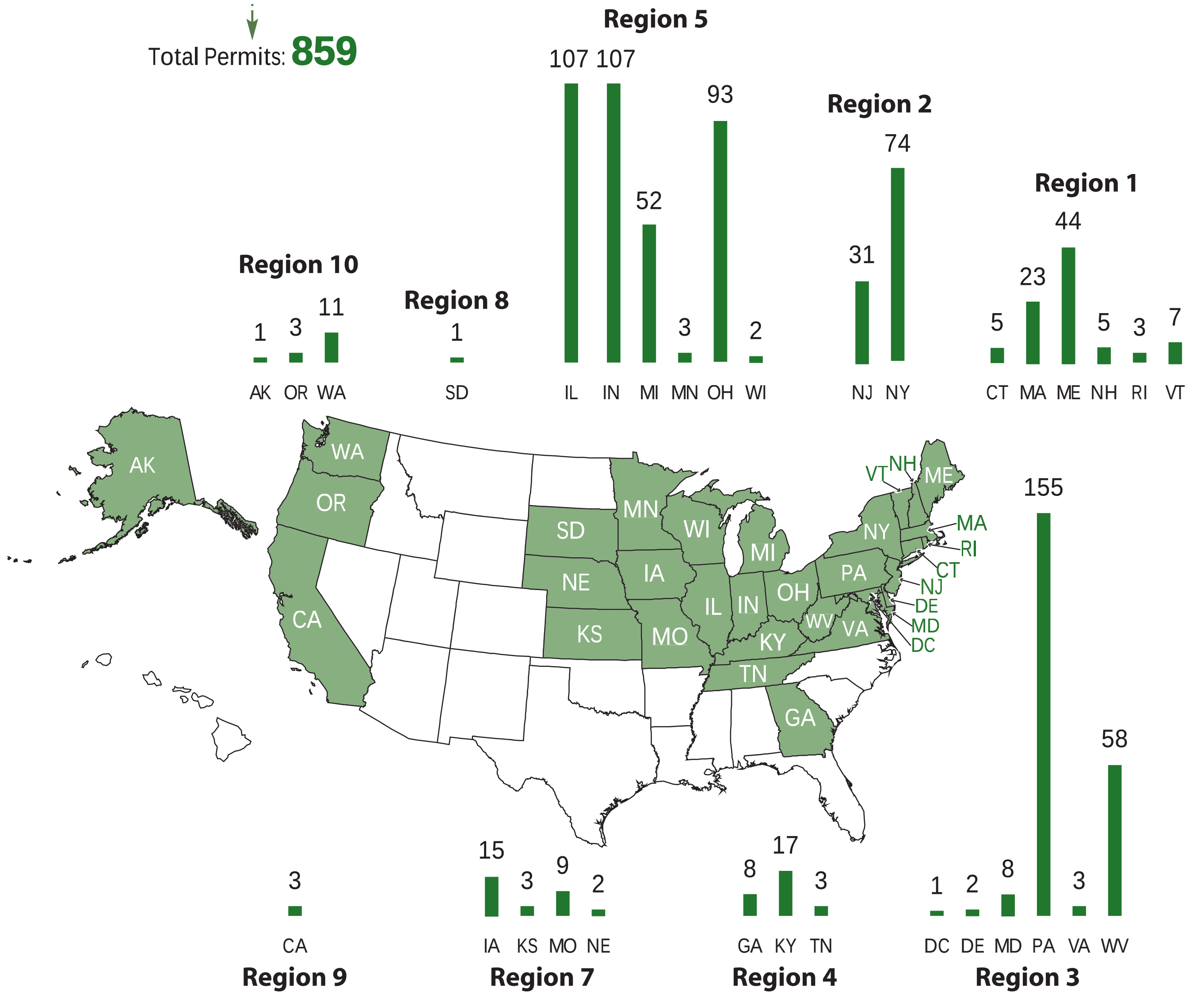
Since implementing CSO controls, San Francisco has reduced the number of CSO events and pollutant loads by an average of 88%.

Photo: Photodisc

Figure ES.1

Distribution of CSO Permits by Region and State

CSOs are found throughout the U.S., but are most heavily concentrated in the Northeast and Great Lakes regions.



permits developed for this report, completed sewer separation projects, and better differentiation between CSSs and separate sewer systems.

- National projections of annual CSO discharges are estimated at 1,260 billion gallons per year.

- Available data indicate the following distribution in receiving waters for CSOs: 43 percent to rivers, 38 percent to streams, five percent to oceans, estuaries and bays, two percent to ponds/lakes, and 12 percent to other waters (ditches, canals, unclassified waters).

- Uncontrolled CSOs continue to impair water quality in areas served by CSSs:

  - According to EPA's 1998 *National Water Quality Inventory*, CSOs are a source of impairment for 12 percent of assessed estuaries (in square miles) and two percent of assessed lakes (in shore miles) (EPA, 2000a).

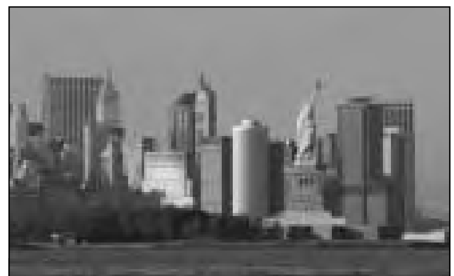
  - According to a state-by-state report of impaired waters listed under CWA Section 303(d), less than one percent of the nearly 15,600 impaired water bodies in states with CSOs are impaired by CSOs. Further, approximately eight percent of the assessed water bodies are impaired by urban runoff (which may include CSOs). Appendix N provides a summary of the 303(d) listed waters.

  - The Natural Resources Defense Council (NRDC) reported in its 2000 *Testing the Waters* report that sewage spills and overflows accounted for 2,230 beach closings and advisories in 2000. Sewage spills in the NRDC report include combined sewer overflows, sanitary sewer overflows, and breaks in sewer lines or septic systems (NRDC, 2001).

- Localized impacts of uncontrolled CSO discharges have been well documented by some communities. For example:

  - New York City reported that prior to CSO control, CSOs caused or contributed to shellfishing restrictions for more than 30,000 acres of shellfish beds. In 1998, New York City reported that improvements to sewage treatment infrastructure and operations, including CSO control, led to the lifting of shell-fishing restrictions.

  - The State of New Jersey reported that prior to CSO floatables control, CSOs caused or contributed to hundreds of days of ocean beach closings each year. The control of floatables in CSOs and storm water discharges has reduced the average annual days of ocean beach closings by more than 95 percent.



Fecal coliform concentrations in New York Harbor have declined dramatically from the early 1970s to the present. This improvement is largely attributable to abatement of raw sewage discharges through the construction and expansion of POTWs, elimination of illegal discharges, and reduction of CSOs.

Photo: Photodisc

What is the status of implementation and enforcement of the 1994 CSO Control Policy?

There has been definitive progress implementing and enforcing CSO controls prior to, and as a result of, the CSO Control Policy, resulting in demonstrable environmental progress in some communities where CSO controls have been instituted. EPA, states, and municipalities all have played important roles in advancing the CSO Control Policy.

EPA Progress

- EPA issued guidance, supported communication and outreach, and provided compliance assistance and some financial support for CSO control.
- EPA issued guidance on coordinating CSO LTCPs with water quality standards in 2001.
- EPA issued extensive technical and policy guidance documents to foster implementation of CSO controls dealing with the NMC, monitoring and modeling, financial capability, LTCPs, and permit writing and water quality standards reviews. EPA has sponsored and conducted more than 15 workshops and seminars on various aspects of implementation of the CSO Control Policy as well as other compliance assistance activities.
- Administrative and civil judicial actions have been used successfully together with permitting and compliance assistance activities to foster development and implementation of CSO controls. Many of the CSO communities that have made the most progress to date, including several of the largest municipalities in the United States, have done so as the result of enforcement actions.
- EPA issued the *Compliance and Enforcement Strategy for Combined Sewer Overflows and Sanitary Sewer Overflows* in 2000.

State Progress

- Most states have made efforts to regulate and control CSOs. NPDES authorities have done extensive work placing conditions for CSO control in permits. In total, 94 percent of CSO communities are required to control CSOs, either through a permit or an enforceable order.
- All 32 states with CSSs developed CSO strategies in response to the National CSO Control Strategy. Most states have adopted the key provisions of the CSO Control Policy:
  - 27 require implementation of the NMC or a suite of best management practices (BMPs) that include or are analogous to the NMC.
  - 25 require development and implementation of LTCPs.
- Most CSO communities are required to implement BMP measures to mitigate CSO-related impacts:

- 94 percent of CSO permits require implementation of one or more BMPs.
- 86 percent of CSO permits have requirements to implement the NMC or a set of BMPs that includes or is analogous to the NMC.
- 6 percent of CSO permits do not require any BMPs.

- Imposition of permit or other enforceable requirements for more capital intensive CSO facility planning (e.g., sewer separation or underground storage) is less extensive:
  - 82 percent of CSO permits include enforceable requirements to develop and implement CSO facilities plan.
  - 65 percent of CSO permits contain requirements to develop and implement an LTCP.
  - 18 percent of CSO permits do not require CSO facilities planning.

- Several states have addressed the full range of programmatic components (e.g.,guidance, compliance assistance, communications and information management, among others). Other states, principally those with fewer CSO communities, have dealt with CSOs on a site-specific basis.

- Many states have provided compliance assistance and most include compliance monitoring of CSOs in their NPDES inspections programs. Many state strategies have been updated since issuance of the CSO Control Policy in 1994. Yet, state programs vary widely in the approaches used to implement the CSO Control Policy.

- Most states have not developed separate, specific procedures for coordinating the review of water quality standards with LTCP development. Some states have approaches for considering water quality standards for CSO receiving waters. For example:
  - Indiana passed legislation providing a mechanism whereby CSO communities may apply for a temporary suspension of state water quality standards when certain criteria are met.
  - Maine passed legislation codifying standard procedures for providing variances for CSO receiving waters during the implementation of an approved LTCP.
  - Massachusetts added a series of refined uses to its state water quality standards use classification system to address CSO-impacted waters.
  - Illinois' water quality standards program framework presumes compliance with water quality standards upon the completed implementation of a CSO facility plan that meets the

criteria for the state-derived presumption approach.

  - Michigan rules allow the use of alternate design flows (i.e., alternate to 7Q10 low flows or 95-percent exceedance flows) when determining water quality based requirements for intermittent wet weather discharges such as treated CSOs.

  - New Hampshire has developed a surface water partial-use designation. A partial-use designation is made only if the community planning process and watershed planning efforts demonstrate that the allowance of minor CSO discharges is the most environmentally protective and cost-effective option available.

- At least 16 states have brought enforcement actions that have included CSO violations. The enforcement actions have primarily been administrative actions, such as administrative compliance orders.

Municipal Progress

- Most CSO communities have documented CSO control through some combination of the NMC and other best management practices.

  - 77 percent of CSO communities have submitted documentation of implementation of one or more of the NMC to their NPDES authority.

  - 32 percent have submitted documentation of implementation of all NMC.

- A smaller number of CSO communities have developed LTCPs.

  - 34 percent of CSO communities have submitted draft LTCPs to their NPDES authority.

  - 19 percent have had their LTCPs approved.

  - 17 percent have initiated implementation of LTCPs or other CSO facility plans.

  - 87 CSO communities have substantially completed implementation of their LTCPs or other CSO control programs.

- CSO communities with LTCPs developed or approved are pursuing attainment of water quality standards in roughly equal measure under three approaches – demonstration, presumption, and a combination of the demonstration and presumption approaches.

- LTCPs indicate that CSO communities are relying on a wide range of technologies to address CSOs including storage (e.g.,tunnels), expanded treatment capacity, sewer separation, and improved conveyance. EPA will be examining the environmental benefits of various CSO control technologies, including sewer separation, in the second Report to Congress in 2003.

What is the nature and extent of environmental accomplishments from CSO control?

EPA has seen some examples of demonstrable public health and environmental improvements in communities that have made substantial progress in controlling CSOs. The second Report to Congress, due in 2003, will focus on the environmental and human health impacts of CSOs and SSOs, the resources spent by CSO communities in controlling them, and an evaluation of CSO technologies. However, some early insights into the environmental gains from CSO controls are provided so that Congress has some sense of the return on federal, state and municipal investments. The following preliminary observations have been made:

- According to EPA's initial modeling estimates, CSO controls have resulted in an estimated 12 percent reduction of untreated CSO volume and pollutant loadings since 1994. EPA developed a preliminary model, GPRACSO, which estimates that since 1994, annual CSO volumes have decreased by 170 billion gallons per year. It also estimates that loadings of biochemical oxygen demand (BOD) have decreased by 125 million pounds per year.

- The number of CSO communities documenting environmental results from CSO control is growing. EPA has identified a number of notable CSO efforts in which significant infrastructure has been completed and environmental improvements noted. For example:

  - Prior to CSO control South Portland, Maine's 35 CSOs discharged approximately 100 million gallons of combined sewer overflows each year to the Fore River and Casco Bay. As of 2001, South Portland has spent nearly $9 million on capital improvements in the CSS and invests another $350,000 annually on CSO-related operations and maintenance activities. These expenditures have resulted in the elimination of 25 of their 35 CSOs, and an 80-percent reduction in the amount of untreated combined sewer overflows discharged from the CSS each year. The City of South Portland has been recognized by the Friends of Casco Bay for its efforts to control CSOs and the resulting positive impact on the Bay.

  - Prior to CSO control, Saginaw, Michigan's 36 CSOs discharged nearly 3 billion gallons of combined sewage each year to the Saginaw River. As of 2001, Saginaw has spent nearly $100 million on capital improvements in the CSS. These expenditures have resulted in the elimination of 20 of 36 CSOs, and a

The City of South Portland has been recognized by the Friends of Casco Bay (shown here) for its positive impact on the Bay.

Photo: Photodisc

75-percent reduction in the amount of combined sewage discharged from the CSS each year. The Saginaw River is now characterized by fishing periodicals as one of the top walleye fisheries in the country.

Key Program Challenges

In developing this Report to Congress, EPA identified several noteworthy challenges to CSO control in the United States. Each of these challenges, based on an overall synthesis of the report findings, is briefly described below.

Financial Challenges

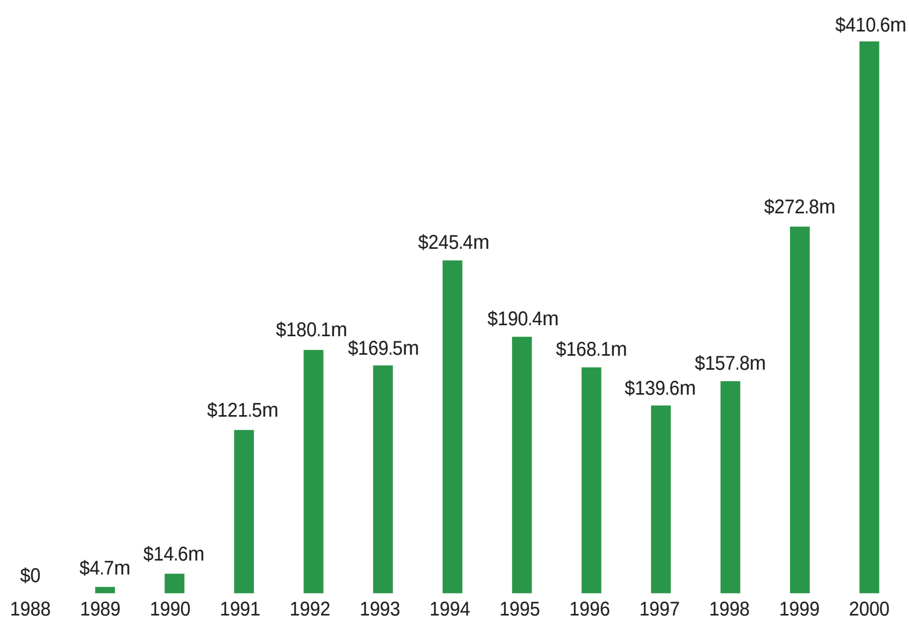
When the CSO Control Policy was issued, EPA estimated the nationwide financial need to control CSOs, consistent with the CSO Control Policy, at $40 billion (in 1992 dollars). More recently, data from EPA's 1996 Needs Survey sets national CSO needs at $44.7 billion (in 1996 dollars). CSO control costs will continue to be considerable, and EPA has received numerous requests from CSO communities for financial assistance, given mounting water and wastewater infrastructure costs and the resource-intensive nature of CSO controls. CSO LTCPs typically involve major infrastructure investments that must compete with other infrastructure needs. Respondents to the AMSA and CSO Partnership surveys reported that funding is the primary challenge in implementing LTCPs.

CSO communities are using a combination of local funding sources, Clean Water State Revolving Fund (SRF) loans, state grants and loans, and, in special cases, line item congressional appropriations to fund CSO controls. EPA does not have data on the total extent of CSO spending.

Figure ES.2

SRF Loans for CSO Projects,1988—2000

SRF loans for CSO projects reached more than $245 million in 1994 and began to rise again in 1998, reaching more than $400 million in 2000. This suggests that funding for the implementation of CSO controls lagged several years behind the issuances of the 1989 Strategy and the 1994 Policy.



Use of SRF loans for CSO infrastructure continues to climb.

- State use of the SRF to fund CSO control projects has increased steadily since 1990. As shown in Figure ES.2, CSO loans in 2000 were the highest ever, accounting for $411 million, or about 12 percent, of total SRF assistance. SRF loans for CSO control totaled $2.08 billion from 1989 to 2000 (about 5 percent of the total CSO need). States with the highest SRF spending levels for CSO control (typically driven by a few large projects) were Illinois, Michigan, New York, and California.

- Congress has appropriated specific CSO infrastructure grants totaling over $600 million for 32 CSO communities since FY 1992.

Congress has shown some support for additional funding for CSO control. The 2000 amendments to the CWA authorize EPA to provide grants to CSO communities, either directly or through states, for planning, design, and construction of CSO and sanitary sewer overflow (SSO) treatment. The amendments also require EPA to provide technical assistance and grants to POTWs for watershed-based management of CSOs, SSOs, and storm water discharges. The EPA Administration requested $450 million for this program in its FY 2002 budget. To date, however, Congress has not appropriated funds for these grant programs.

Water Quality Standards Review

The CSO Control Policy anticipated that development of LTCPs would be coordinated with the review and revision, as appropriate, of water quality standards. Many reasons, including institutional barriers, exist for the lack of coordination in the LTCP development and water quality standards review processes. States cite public pressure to maintain their water quality standards, EPA requirements for development of a “use attainability analysis” (UAA) prior to revising a state water quality standard, and the lack of water quality monitoring data that could be used to justify water quality standards revisions. During EPA-sponsored listening sessions held in the spring of 1999, designed to support development of guidance for coordinating CSO LTCPs and water quality standards reviews, many participants expressed concern about the complexity of the process for revising water quality standards.

Among the changes in the 2000 amendments to the CWA, Congress added Section 402(q) to require issuance of guidance to facilitate the conduct of water quality and designated use reviews for CSO receiving waters by July 31, 2001. EPA prepared a draft guidance for public review and comment (66 FR 364, January 3, 2001) and issued the final guidance on August 2, 2001.

Information Management and Performance Measurement

This Report to Congress relied extensively on an assessment of CSO information that resides in EPA and state files. EPA believes that this additional information on progress in implementing CSO controls and derived water quality benefits exists at the community level. EPA was hindered by the lack of a national data system for comprehensively evaluating the implementation and effectiveness of the CSO program, and by the lack of clear, national performance measures in place to assess the effectiveness of CSO control efforts on a national basis.

EPA Actions and Next Steps

What actions will EPA take to improve implementation and enforcement of the CSO Control Policy?

Despite significant efforts and progress by EPA, states, and CSO communities to implement CSO controls, more work remains to ensure that human health and the environment are adequately protected from CSOs. The 1994 CSO Control Policy provides a sound and appropriate framework for developing and implementing cost-effective CSO controls. With the codification of the CSO Control Policy in the 2000 amendments to the CWA, EPA will continue to work in partnership with the states to address remaining CSO issues. EPA will work aggressively with NPDES authorities, water quality standards authorities, and CSO communities to implement and enforce the CSO Control Policy. Based on the findings of this Report to Congress, EPA will pursue a number of activities to ensure the continued effective implementation and enforcement of the CSO Control Policy.

Ensure That all CSOs are Appropriately Controlled.

- Implement the "shall conform" statutory mandate.
  - Begin efforts to implement new CWA Section 402(q)(1), which requires that future permits or other enforceable mechanisms for CSOs conform to the CSO Control Policy.
- Ensure all CSOs are covered by an NPDES permit or other enforceable mechanism.
  - Follow up with NPDES authorities to ensure that NPDES permits or other enforceable mechanisms are issued as soon as possible for those CSO communities that have not yet been required to control CSOs. EPA will also work with the states to ensure that permits and enforcement actions (e.g.,orders, decrees) conform with the CSO Control Policy, as required by the 2000 amendments to the CWA.

Improve Implementation of the CSO Control Policy.

- Advocate CSO control on a watershed basis.
  - Continue efforts to focus protection of water quality on a watershed scale, and support development of LTCPs on a

watershed basis. EPA will continue efforts to encourage integration of wet weather programs, including support to facilitate wet weather pilot projects as designated in the 2000 CWA amendments.

- Work with states to speed the water quality standards review and revision process.
  - Continue to work with states, communities, and constituency groups on coordinating the review and revision of water quality standards with development of LTCPs. EPA will establish a tracking system for water quality standards reviews on CSO receiving waters. EPA will also assess the need for additional guidance and tools to facilitate the water quality standards review process for all sources, including CSOs.
- Strengthen CSO information management.
  - Ensure that the Office of Water and the Office of Enforcement and Compliance Assurance coordinate information management and performance measurement activities to demonstrate the environmental outcomes and benefits of CSO control.
- Improve compliance assistance and enforcement.
  - CSOs will continue to be a national compliance and enforcement priority in fiscal years 2002 and 2003. EPA will work closely with NPDES authorities to target enforcement actions, where appropriate, to ensure compliance with the CSO requirements in NPDES permits or other enforceable mechanisms. In addition, EPA will develop and promote compliance assistance tools.

Initiate Efforts for 2003 Report to Congress.

- Initiate efforts to define the scope and methodology for the second Report to Congress on efforts related to CSO controls. By December 2003, EPA is required to summarize the extent of human health and environmental impacts caused by CSOs and SSOs, report on the resources spent by municipalities to address these impacts, and evaluate the technologies used, including whether sewer separation is environmentally preferred for all situations. EPA will build on CSO data collected for this report and develop a methodology for addressing the challenges of collecting and analyzing SSO data.

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.

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).

In this chapter:

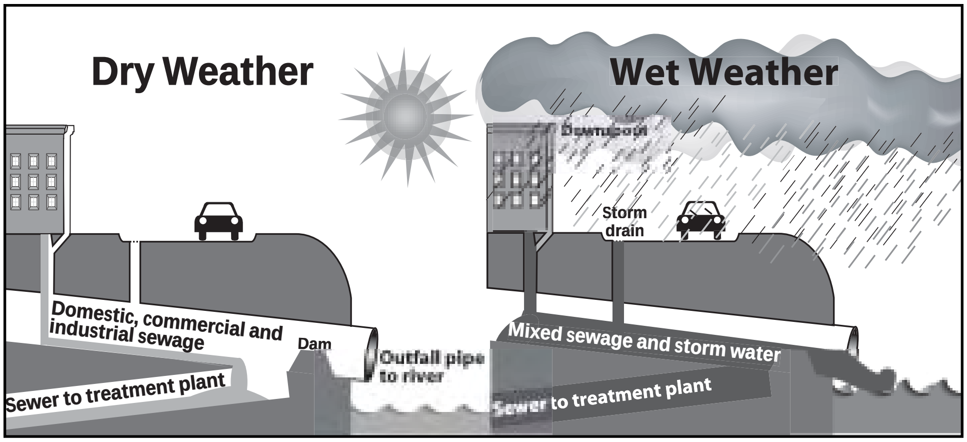
Typical CSO outfall discharge following a storm

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.

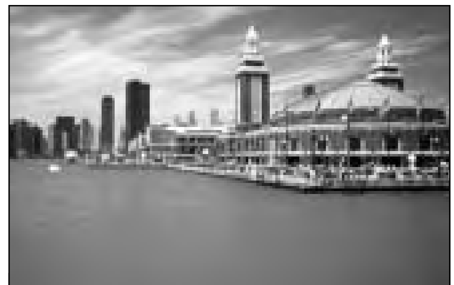
The CSO Control Policy is a comprehensive national strategy to ensure that municipalities, NPDES permitting and water quality standards authorities, EPA, and the public engage in a comprehensive and coordinated planning effort to achieve cost-effective CSO controls that ultimately meet the requirements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

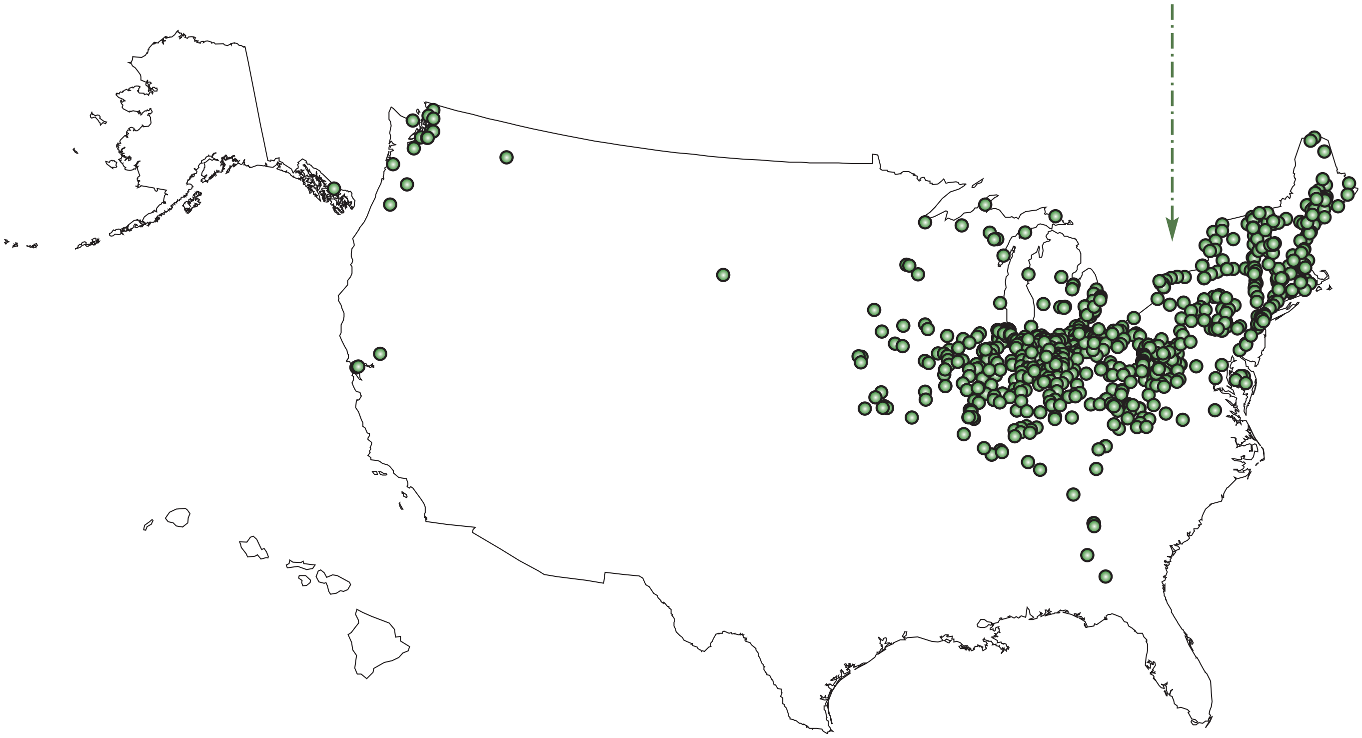
2.2 Environmental and Public Health Impacts of CSOs

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)

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).

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

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.

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.

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

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:

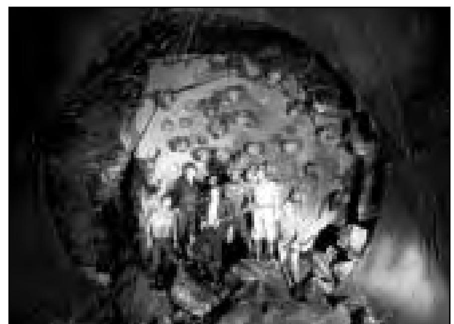
- Atlanta, Georgia
- Chicago, Illinois
- Columbus, Georgia
- Louisville and Jefferson County Municipal Sewer District, Kentucky
- Massachusetts Water Resources Authority, Boston, Massachusetts
- Richmond, Virginia
- Rouge River, Michigan
- San Francisco, California
- Washington, DC

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

In this chapter:

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.

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

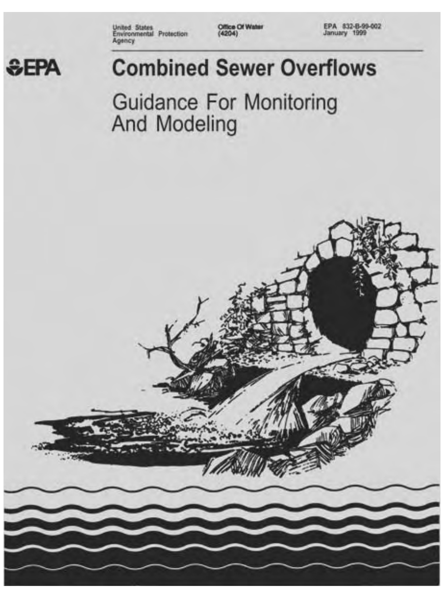
EPA and the State of Georgia consolidated enforcement efforts with citizen plaintiffs in the case of Upper Chattahoochee Riverkeeper Fund, Inc., et. al. v. the City of Atlanta. The City had violated NPDES permit requirements due to CSOs. Atlanta also had SSO, operation and maintenance, effluent limit,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

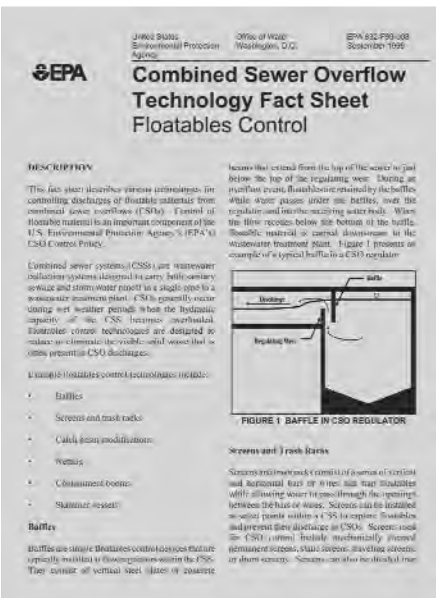
EPA's NPDES Permit Writers' Manual (EPA, 1996a) provides permit writers the technical and legal guidance to develop NPDES permits. The manual describes CSO policy provisions and discusses the phased permit process for CSOs and the suggested permitting conditions that correspond to each phase.

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


EPA

Combined Sewer Overflow Technology Fact Sheet
Floatables Control

FIGURE 1 BAFFLE IN CSO REGULATOR

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 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.

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

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.

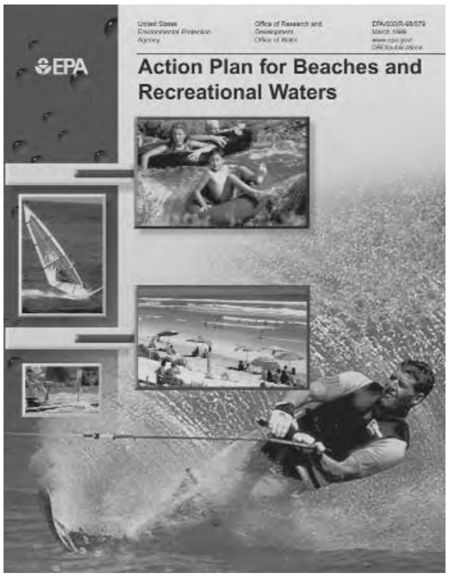
As a result, EPA has been unable to use PCS to track reductions in CSO frequency, CSO volume, and pollutant loadings at a national or state scale.

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.

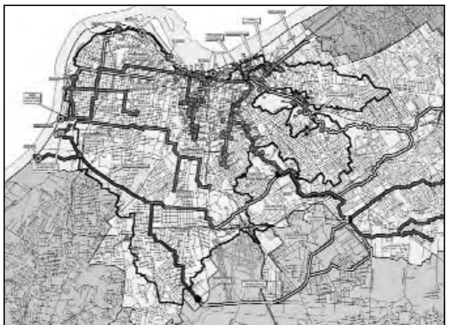
Source Water Protection Program

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.

Chapter 5

CSO Control Policy Implementation Status: NPDES Authorities and Other State Programs

In this chapter:

EPA's 1994 CSO Control Policy assigns primary responsibility for its implementation and enforcement to NPDES authorities and water quality standards authorities. The major provisions of the CSO Control Policy are as follows:

> *NPDES authorities will issue/reissue or modify permits, as appropriate, to require compliance with the technology-based and water quality-based requirements of the CWA... ...NPDES authorities should ensure the implementation of the minimum technology-based controls and incorporate a schedule into an appropriate enforceable mechanism ...*
>
> *The water quality standards authorities will help ensure that development of the CSO permittees' long-term control plans are coordinated with that review and possible revision of water quality standards ...*

NPDES authorities include both permitting and enforcement staff, the distinct roles of which are outlined in the CSO Control Policy and detailed in Table 5.1. NPDES authorities are usually state environmental agencies, but are EPA regional offices where states have not obtained the authority to issue and enforce NPDES permits.

State water quality standards authorities are responsible for adopting, reviewing, and revising water quality standards. The specific role of the state water quality standards authority, as defined by the CSO Control Policy, is described in Table 5.1.

As shown in Table 5.2, 32 states (including the District of Columbia) have CSO permittees in their jurisdiction. State agencies are the NPDES authority in 28 of these states. Programs in Alaska, the District of Columbia, Massachusetts, and New Hampshire are administered by EPA regional offices.

States and territories without CSO permittees within their jurisdiction, as certified by the state and confirmed by

Table 5.1

Roles and Responsibilities

The CSO Control Policy describes specific expectations for NPDES permitting and enforcement authorities, and state water quality standards authorities in developing and implementing CSO controls that meet CWA objectives and requirements.

NPDES Permitting	NPDES Enforcement	State WQS Authority
• Reassess/revise CSO permitting strategy • Incorporate CSO-conditions (e.g., NMC and LTCP) • Review documentation of NMC implementation • Coordinate review of LTCP components throughout LTCP development process and accept/approve permittee's LTCP • Coordinate review and revision of water quality standards, as appropriate • Incorporate implementation schedule into an appropriate enforceable mechanism • Review implementation activity report	• Monitor compliance with January 1, 1997 deadline for NMC implementation and documentation • Take appropriate enforcement actions against dry weather overflows • Monitor compliance with permit requirements • Ensure CSO requirements and schedules for compliance are incorporated into appropriate enforceable mechanisms • Incorporate implementation schedules longer than three years in a judicial court order	• Review water quality standards in CSO-impacted receiving water bodies • Coordinate review with LTCP development to ensure long-term controls will be sufficient to meet water quality standards • Revise water quality standards as appropriate, subject to EPA approval

Source: *Combined Sewer Overflow Guidance for Long-Term Control Plan*

the EPA regional office, are listed in Table 5.3.

As of June 2001, the 32 states with combined sewer systems hold a total of 859 CSO permits. The permits authorize discharges from 9,471 CSO outfalls. The numbers of CSO permits and permitted outfalls in each state are shown in Figure 5.1 and Figure 5.2, respectively. Historically, the reported number of CSO permits nationwide has varied from fewer than 900 to more than 1,500. Similarly, the reported number of CSO outfalls has ranged from fewer than 9,000 to approximately 15,000. Comparisons of historic CSO permits and outfalls estimates with those developed for this report are inappropriate due to improvements in the quality of information available on CSSs and changes in the way they are permitted. For example, since the issuance of the 1989 National CSO Control Strategy, the number of CSO permits has declined steadily as states have undertaken efforts to better identify CSSs. A number of permits were reclassified when system characterizations revealed "leaky" sanitary systems, rather than combined sewers. Conversely, recent decisions by NPDES authorities have increased the number of CSO permits in some states (e.g., Pennsylvania, New Jersey) through the issuance of general permits to communities with CSSs and CSO outfalls, but without treatment plants. Previously, these collection systems often received permit coverage through the facility treating its wastewater. Collection systems with no associated POTW are often referred to as "satellite collection systems."

This chapter documents how NPDES authorities and state water quality standards authorities have implemented and enforced the CSO Control Policy. Areas addressed include:

- Pre-policy CSO strategies developed by NPDES authorities in response to the 1989 National CSO Control Strategy.
- Efforts of NPDES authorities to meet the requirements of the CSO Control Policy.
- Enforcement and compliance strategies being applied to ensure compliance with the CWA as soon as practicable.
- Compliance assistance activities by states to help local governments comply with CSO requirements.
- Information management systems and techniques developed to facilitate CSO Control Policy implementation.
- Mechanisms for internal and external communication and participation in CSO Control Policy implementation.

Table 5.2

States With CSO Permits

As of 2001, 32 states (including the District of Columbia) have CSO permits.

Region	State	Permitting Authority
1	Connecticut	Connecticut Department of Environmental Protection
	Maine	Maine Department of Environmental Protection
	Massachusetts	EPA Region 1
	New Hampshire	EPA Region 1
	Rhode Island	Rhode Island Department of Environmental Management
	Vermont	Vermont Department of Environmental Conservation
2	New Jersey	New Jersey Department of Environmental Protection
	New York	New York State Department of Environmental Conservation
3	Delaware	Delaware Department of Natural Resources and Env. Control
	Maryland	Maryland Department of the Environment
	Pennsylvania	Pennsylvania Department of Environmental Protection
	Virginia	Virginia Department of Environmental Quality
	West Virginia	West Virginia Department of Environmental Protection
	Dist. of Columbia	EPA Region 3
4	Georgia	Georgia Department of Natural Resources
	Kentucky	Kentucky Department for Environmental Protection
	Tennessee	Tennessee Department of Environment and Conservation
5	Illinois	Illinois Environmental Protection Agency
	Indiana	Indiana Department of Environmental Management
	Michigan	Michigan Department of Environmental Quality
	Minnesota	Minnesota Pollution Control Agency
	Ohio	Ohio Environmental Protection Agency
	Wisconsin	Wisconsin Department of Natural Resources
7	Iowa	Iowa Department of Natural Resources
	Kansas	Kansas Department of Health and Environment
	Missouri	Missouri Department of Natural Resources
	Nebraska	Nebraska Department of Environmental Quality
8	South Dakota	South Dakota Department of Environment and Natural Resources
9	California	California State Water Resources Control Board
10	Alaska	EPA Region 10
	Oregon	Oregon Department of Environmental Quality
	Washington	Washington Department of Ecology

- Measures of environmental impacts and benefits of the CSO Control Policy.
- Funding mechanisms for CSO program implementation.

5.1 Policy Development and Support

Prior to the issuance of the National CSO Control Strategy, some states (e.g., Illinois, Ohio, and Washington) developed state strategies or regulations requiring CSO planning and abatement in varying degrees. Other states implemented requirements for CSO control through administrative orders (e.g., Tennessee) or through enforcement mechanisms on a case-by-case basis (e.g., Wisconsin—Milwaukee, New York—New York City). As described in Chapter 2, however, the National CSO Control Strategy prompted many NPDES authorities to initiate CSO control activities.

5.1.1 Efforts to Adhere to the 1989 National CSO Control Strategy

The National CSO Control Strategy contained some elements that originated in existing state programs, including the suggestion, drawn from Illinois' six minimum measures, that NPDES authorities consider requiring BMPs to be applied as BAT on a BPJ basis. Furthermore, the National CSO Control Strategy urged states to develop a CSO permitting strategy or certify that no combined sewer

Table 5.3

States With No CSO Permits

As of 2001, 19 states, the Commonwealth of Puerto Rico, Tribal Nations, and two territories report having no active CSO outfalls. Each state or tribal agency has certified this assessment, either verbally or in writing, to its EPA Region.

Region	State/Territory	Notes
2	Puerto Rico	No CSOs per Region's verbal certification.
	US Virgin Islands	No CSOs per Region's verbal certification.
4	Alabama	September 1988 letter certifying no known CSOs.
	Florida	October 1992 letter noting elimination of Florida's last CSO.
	Mississippi	September 1988 letter certifying no known CSOs.
	North Carolina	October 1988 letter certifying no known CSOs.
	South Carolina	October 1990 letter certifying no known CSOs.
6	Arkansas	September 1989 letter noting elimination of Arkansas' last CSO.
	Louisiana	October 1989 letter certifying no known CSOs.
	New Mexico	August 1989 letter certifying no known CSOs.
	Oklahoma	September 1989 letter certifying no known CSOs.
	Texas	August 1988 letter certifying no known CSOs.
8	Colorado	Region verbally certified elimination of Colorado's last CSO.
	Montana	November 1990 letter certifying no known CSOs.
	North Dakota	November 1990 letter certifying no known CSOs.
	Utah	November 1990 letter certifying no known CSOs.
	Wyoming	November 1990 letter certifying no active CSOs.
9	Arizona	October 1990 letter certifying no known CSOs.
	Hawaii	October 1990 letter certifying no known CSOs.
	Nevada	Verbally certified no known CSOs to Region on October 1990.
	Pacific Islands	No CSOs per Region's verbal certification.
	Tribal Nations	No CSOs per Region's verbal certification.
10	Idaho	September 1990 letter certifying no active CSOs.

Figure 5.1

Distribution of CSO Permits by Region and State

CSOs are found throughout the United States, but are most heavily concentrated in the Northeast and Great Lakes regions.

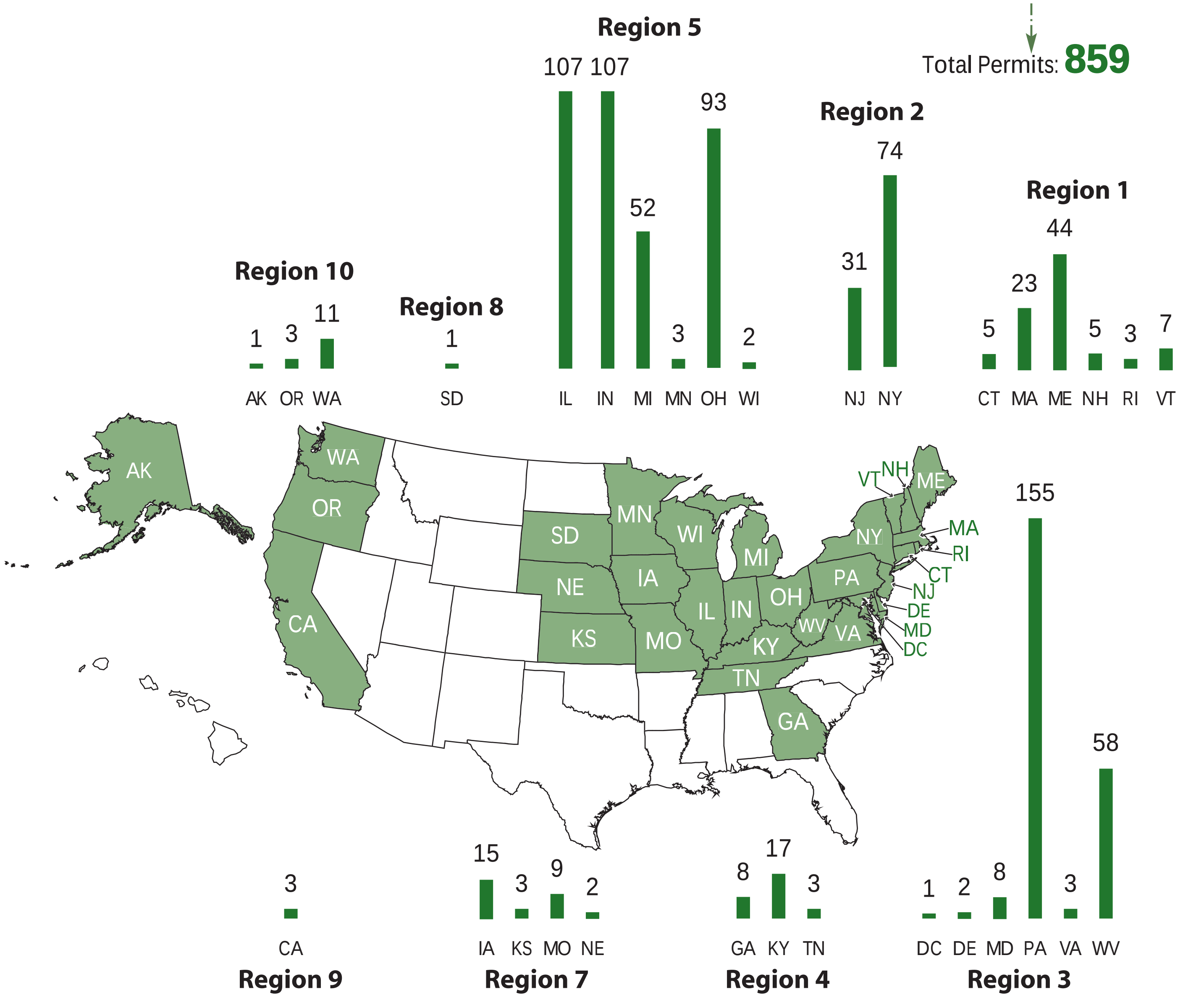
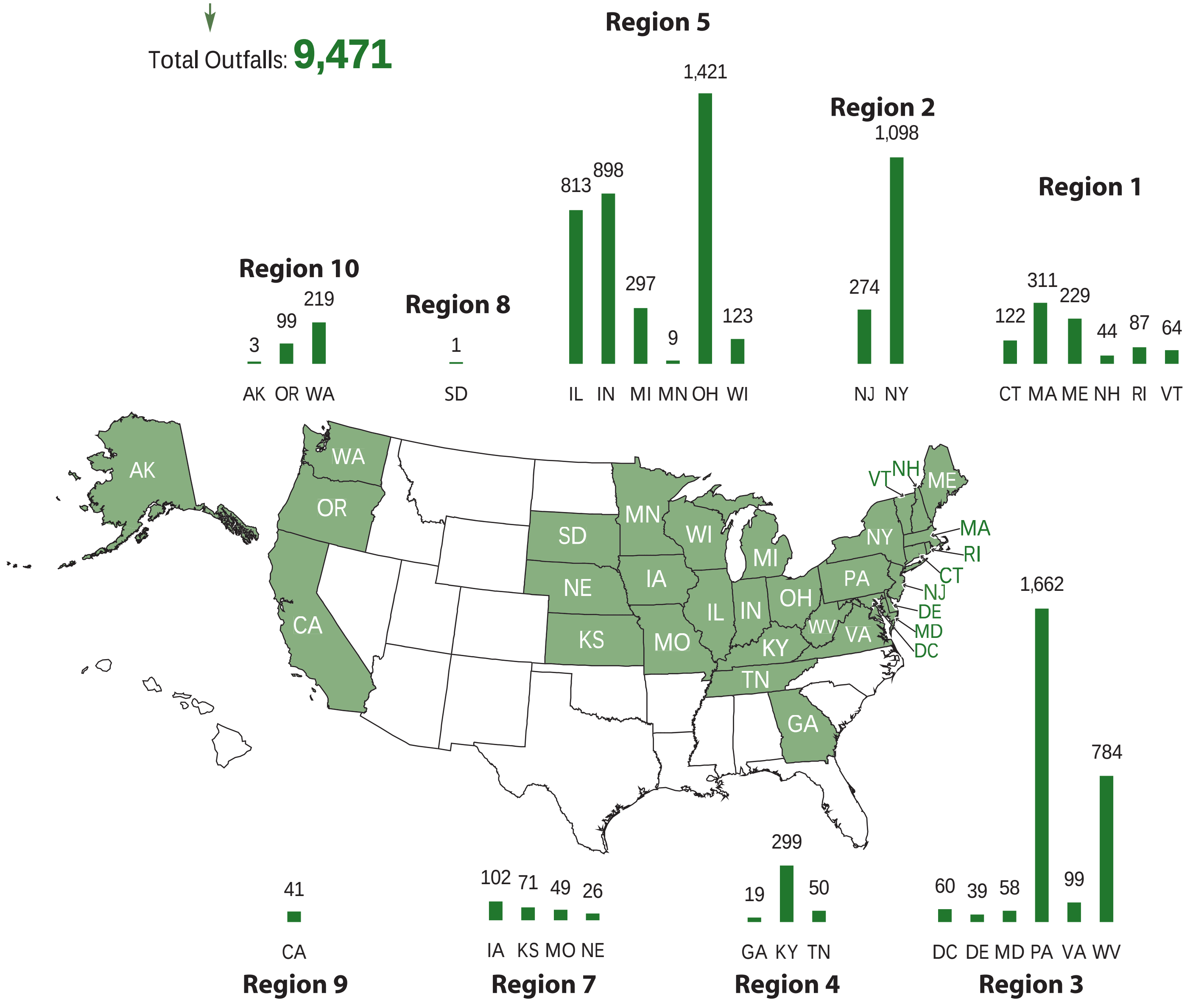


Figure 5.2

Distribution of CSO Outfalls by Region and State

Similar to the distribution of CSO permits, CSO outfalls are also concentrated in the Northeast and Great Lakes regions.



systems operated within their boundaries by 1990. The overall goal for the CSO permitting strategies was compliance with the CWA. The strategies included provisions to eliminate dry weather overflows and to minimize the impacts of CSOs.

A majority of states with CSO permits (20 of 32) developed CSO strategies by the 1990 deadline. Those states submitting strategies after the deadline tended to be states with large numbers of CSO communities (e.g., Indiana, New York, Pennsylvania, and West Virginia). All permitting authorities, except New York, had strategies in place by 1991. New York finalized its strategy in 1993.

CSO strategies ranged from detailed documents discussing statewide approaches for implementation of CSO controls within the NPDES program framework (e.g., Maine, Michigan, and Oregon), to lists of current CSO permits noting how each was or would be addressed (e.g., Alaska, Minnesota, and Wisconsin). Typically, the latter approach was reserved for NPDES authorities with few CSO permits.

Just as CSO strategies varied from state to state, so did procedures for strategy implementation. Implementation procedures typically added CSO strategy elements to reissued permits or included CSO strategies as part of a state regulation or code.

CSO strategy requirements were added to NPDES permits as early as 1990 (Illinois) and as recently as 1999 (Connecticut). Notably, most NPDES authorities did not complete a full five-year permit cycle between the issuance of its own CSO strategy and 1994, when the CSO Control Policy was published. This means that NPDES authorities would not necessarily have added CSO requirements from its strategy in all CSO permits before the CSO Control Policy was issued.

5.1.2 Efforts to Adhere to the 1994 CSO Control Policy

As described in Chapter 2, the CSO Control Policy defined roles for and provided guidance to NPDES authorities, water quality standards authorities, and CSO communities on the selection and implementation of CSO controls. Specifically, the CSO Control Policy expected that NPDES authorities would:

- 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 immediately implement the NMC and document implementation, and to develop and comply with an LTCP.
- Promote coordination among the CSO community, the state water quality standards authority, and the general public during LTCP development and implementation.
- Consider evaluating water pollution control needs on a watershed basis, and coordinate CSO control with the control of

other point and nonpoint sources of pollution.

- Recognize the difficulty for some small communities in meeting 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 the permit holder's financial capability in the review and approval of implementation schedules.

NPDES authorities generally took one of four approaches in responding to the CSO Control Policy:

- Revised existing CSO strategy to match CSO Control Policy requirements. NPDES authorities revised their existing CSO strategies, adding elements to their permitting approach to match components of the CSO Control Policy.

- Continued implementation of existing CSO strategy. NPDES authorities did not respond immediately to the CSO Control Policy, but continued to implement existing CSO strategies while determining if or how to incorporate components of the CSO Control Policy into their permitting programs.

- Adopted approach with requirements beyond or outside CSO Control Policy. NPDES authorities continued to use existing strategies or developed new strategies advocating approaches beyond or outside the context of the CSO Control Policy.

- Developed CSO control programs on a site-specific basis. This approach was generally used by NPDES authorities with fewer than five CSO permits within their jurisdiction. These authorities typically worked with the CSO communities to develop site-specific CSO control programs, incorporating elements of the CSO Control Policy as applicable.

A profile of each state, including the NPDES authority's approach to regulating CSOs, is provided in Appendix B.

Revised Existing CSO Strategy to Match CSO Control Policy Requirements

The following NPDES authorities revised existing strategies to be consistent with the CSO Control Policy:

- Region 1 in Massachusetts
- Region 1 in New Hampshire
- Connecticut
- Georgia
- Indiana
- Kentucky
- Maine
- Maryland
- Missouri

- Ohio
- West Virginia

These NPDES authorities updated procedures to add components contained in the CSO Control Policy. In general, changes were made to CSO permits during renewal. Typically, permits were not re-opened to include new provisions. In addition, these NPDES authorities often steered the CSO program by advocating a preferred approach for CSO control, such as sewer separation or transportation of wet weather flows to a POTW for minimum required treatment. NPDES authorities' interpretations of NMC and LTCP requirements are discussed in more detail in Section 5.4 of this report.

Continued Implementation of Existing CSO Strategy

Some NPDES authorities implementing CSO control programs or strategies prior to issuance of the 1994 CSO Control Policy chose to continue implementation of the existing programs while evaluating how or if to include the provisions of the CSO Control Policy. NPDES authorities using this approach included:

- Illinois
- Iowa
- Michigan
- Vermont

Two of these NPDES authorities (Michigan and Illinois) adjusted programs to include select elements of the CSO Control Policy, while another (Vermont) believed its existing approach to be adequate. One NPDES authority (Iowa) assigned a low priority to CSOs, given the limited numbers of CSOs and other competing program priorities, including urban storm water and agricultural runoff. Examples of this range include:

- Illinois began implementing one of the nation's first CSO control programs in 1985. Its state CSO policy contained many guiding principles identified in the National CSO Control Strategy, including a state-defined presumption approach. By the time of the 1994 CSO Control Policy, Illinois was nearly 10 years into the implementation of its state policy. In response to the CSO Control Policy, Illinois incorporated requirements for the three additional BMPs into permits so that CSO permits would comply with the NMC requirements. Since all Illinois CSO communities had been required to meet state CSO treatment requirements, no provisions were made to require LTCP development, unless post-construction compliance monitoring determined the need for additional CSO controls. Prior CSO control infrastructure planning may have been included in municipal or facility plans.

- Vermont's 1990 CSO strategy advocated sewer separation and required four BMPs for optimizing the performance of combined sewer systems. The Vermont strategy also required

Chicago had one of the nation's earliest large-scale CSO control programs. As of 2001, Chicago's Tunnel and Reservoir Project (TARP) has cumulatively captured 565 billion gallons of combined sewage that would otherwise have flowed to area receiving waters.

Photo: Metropolitan Water Reclamation District of Greater Chicago that an administrative order (AO) be issued to CSO communities that opted not to pursue sewer separation. The AO required such communities to identify control options and funding needs. Vermont provided state grants and interest-free loans to facilitate and accelerate CSO planning and projects. Rather than changing its approach to align with the CSO Control Policy, Vermont continued implementation of its 1990 CSO strategy. To date, 20 of 27 original CSO communities have completed their sewer separation projects and are no longer considered by the state to be CSSs.

- Iowa's 1990 CSO strategy met the requirements of the National CSO Control Strategy and identified several additional components requiring:
    - An inventory of all CSO discharge points.
    - An evaluation of current water quality standards and stream use designations and technology-based limitations for wet weather CSO water quality impacts.
    - A state rule-making process for implementing and enforcing the strategy.
    - A process for including the provisions in the strategy in the NPDES permitting process.

Given the limited number of CSO permits and other priorities in its state water program, Iowa took a wait-and-see approach to determine if the CSO Control Policy would be revised before revising its state strategy. In 2001, Iowa began including NMC and LTCP requirements in reissued CSO permits, for communities not proceeding with separation.

Adopted Approach With Requirements Beyond or Outside CSO Control Policy

Some NPDES authorities developed and implemented programs with notable variation on the measures outlined in the CSO Control Policy. NPDES authorities using this approach included:

- New Jersey
- New York
- Pennsylvania
- Washington

Permitting authorities often developed approaches based on priorities for wastewater pollution control as related to CSOs (e.g., New York), the desire to emphasize abatement of specific pollutants associated with CSO discharges (e.g., New Jersey), the need or desire to be more proscriptive at a state level (e.g., Pennsylvania, Washington), or the decision to integrate CSO controls within a watershed management approach. Examples include:

- New York uses its Environmental Benefit Permit Strategy (EBPS) to establish priorities for reissuing permits based on the environmental benefits to be gained by modifying the permit, rather than reviewing permits in chronological order. Under the EBPS, permits receive a numerical score for each of 15 factors applicable to that particular permit. Two factors are specific to CSO control: permit requirements to implement the 15 BMPs, and permit requirements to develop and submit an LTCP. New York's goal is to revise the top 10 percent of state-issued NPDES permits based on the priority ranking list each year.

- Under the New Jersey Sewerage Infrastructure Improvement Act (enacted in 1988), the state initiated a program that, in part, provides planning and design grants for the development and implementation of solids and floatables control measures, and for the identification and elimination of dry weather overflows. Communities with CSO discharges are required to capture, remove, and properly dispose of all solid and floatable materials from CSO discharges that would have been captured with a 1/2-inch bar screen. All CSO points must be controlled.

- Pennsylvania's strategy identifies two requirements for CSO permits prior to the implementation of the NMC and development of an LTCP: a system inventory characterization report (identifying all outfalls, providing engineering drawings of the outfall structures, and determining if outfalls discharge to sensitive waters); and a system hydraulic characterization report (containing a detailed analysis of the hydraulic capacity of the system and a statistical analysis of area precipitation data related to overflow events). While these components are typical of the NMC and LTCPs, Pennsylvania considers the reports prerequisites to the development and implementation of CSO controls.

- In 1987, Washington State codified (State Code 173-245 WAC) its approach of reducing CSO discharges to no more than one untreated event per average year, including implementation of several BMPs and development of a CSO facilities reduction plan. Washington asserted that the components of its state program met or exceeded the CSO Control Policy in all areas except public participation. Washington now requires increased public participation in CSO planning and includes such provisions through permit conditions upon reissuance.

Developed CSO Control Programs on a Site-Specific Basis

In response to the National CSO Control Strategy, NPDES authorities with fewer than five CSO permits typically submitted a list of the CSO permits, noting how each was or would be addressed. With the issuance of the CSO Control Policy, these NPDES authorities incorporated elements of the Policy into site-specific programs, as appropriate. NPDES authorities using this approach included:

New Jersey provides CSO communities with planning and design grants for solids and floatables control measures, such as nets like the system used in North Bergen.

Photo: NJ Department of Environmental Protection

- Region 3 (District of Columbia)
- Region 10 in Alaska
- California
- Delaware
- Kansas
- Minnesota
- Nebraska
- Oregon
- Rhode Island
- South Dakota
- Tennessee
- Virginia
- Wisconsin

Some NPDES authorities (California, Delaware, District of Columbia, Kansas, Oregon, Rhode Island, South Dakota, Tennessee, Virginia) adjusted permits to include elements of the CSO Control Policy in one or more of its CSO permits. Nebraska has not implemented the CSO Control Policy. Some NPDES authorities (Alaska, Minnesota, Wisconsin) indicated that their CSO communities had implemented CSO control plans that rendered changes to permits in response to the CSO Control Policy unnecessary.

A variable and evolving set of CSO controls resulted from these different approaches and schedules, which were incorporated into permits as the permits were reissued. This variability is discussed further in Section 5.2.

5.2 NPDES Permitting

As discussed in Chapter 2 of this report, CSOs are point source discharges subject to NPDES permit requirements, including both technology-based and water quality-based requirements of the CWA. The CSO Control Policy specifically expects NPDES authorities should, at a minimum, include requirements in CSO permits for the following:

> *...demonstration of implementation of the nine minimum controls and development of the long-term control plan ...*
>
> *... implementation of a long-term CSO control plan ...*

As of June 2001, 859 CSO permits for CSSs regulated discharges from 9,471 CSO outfalls. Each of the 859 permits contained a site-specific list of CSO outfalls. In addition, most NPDES authorities have imposed requirements for, or initiated action resulting in, implementation of CSO controls:

- 94 percent of CSO permits include enforceable requirements to implement low-cost BMP measures to mitigate CSO-related impacts.
- 82 percent of CSO permits include an enforceable requirement to develop a CSO facilities plan outlining more capital intensive plans for CSO control.

Further, the requirements for CSO control employed by the majority of NPDES authorities are similar to those outlined in the CSO Control Policy. Specifically:

- 86 percent of CSO permits include enforceable requirements to implement the NMC, or analogous BMP measures.
- 65 percent of CSO permits include an enforceable requirement to develop an LTCP.

This section describes individual approaches taken by NPDES authorities for CSO control, and compares these approaches with the NMC and LTCP elements described in the CSO Control Policy. In addition, Appendix B contains profiles of each state, including information on the permitting, enforcement, compliance assistance (where noted), and water quality standards programs in each state.

5.2.1 Permit Requirements for NMC

Implementation Requirements

As shown in Figure 5.3, 807 (94 percent) of the 859 CSO permits have requirements to implement one or more BMPs to mitigate the impacts of CSO discharges. Further, Figure 5.3 shows that 740 of the 807 permits with requirements to implement BMPs are specifically required to implement the NMC (or a set of BMPs that include or are analogous to the NMC).

Figure 5.3 also shows that of the 52 permits that have no requirements to implement any BMPs:

- 14 permits had committed to full sewer separation prior to the issuance of the CSO Control Policy, and have not been required to implement the NMC.
- 21 permits are expired and have not been reissued since the inception of the CSO Control Policy.
- 17 permits have been reissued since the CSO Control Policy without requirements to implement BMPs to mitigate the impacts of CSOs.

Figure 5.4 provides a state-by-state summary of the number of CSO permits with requirements to implement one or more BMPs, as well highlighting those states with BMP requirements that include or are analogous to the NMC.

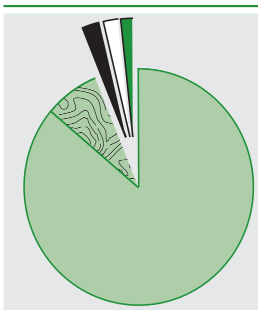
Most states require CSO BMPs in permits. Of the NMC, the first six measures are the most widely implemented.

Photo: NJ Department of Environmental Protection

Figure 5.3

Status of NMC Requirements in CSO Permits

740 of 859 CSO permits have a requirement to implement the NMC. An additional 67 permits have requirements to implement a set of BMPs that are less rigorous than the NMC.



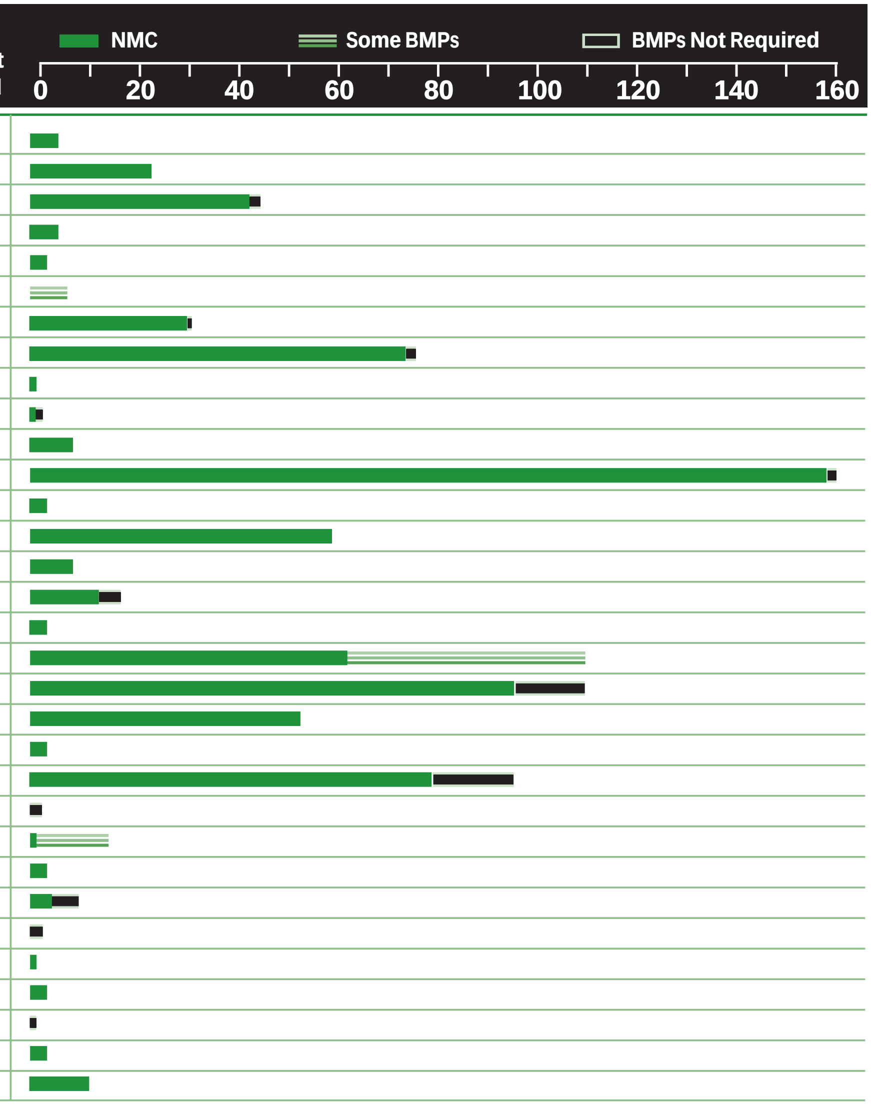
Category	#of Permits	Percent
Permit Requires NMC and Documentation	740	86.1%
Permit Requires Some BMPs	67	7.9%
Permit Does Not Require BMPs		
Permit Not Reissued Since 1994	21	2.4%
Reissued Without Requirements	17	2.0%
Permittee is Separating	14	1.6%
Total Permits	**859**	**100.0%**

Figure 5.4

CSO Permits With Requirements to Implement the NMC

29 of 32 states require implementation of BMPs in one or more of their CSO permits. States with no BMP requirements account for fewer than 1 percent of CSO permits.

Region	State	# Permits	NMC Required	Some BMPs Required	BMPs Not Required
1	CT	5	5	0	0
	MA	23	23	0	0
	ME	44	42	0	2
	NH	5	5	0	0
	RI	3	3	0	0
	VT	7	0	7	0
2	NJ	31	30	0	1
	NY	74	72	0	2
3	DC	1	1	0	0
	DE	2	1	0	1
	MD	8	8	0	8
	PA	155	153	0	2
	VA	3	3	0	0
	WV	58	58	0	0
4	GA	8	8	0	0
	KY	17	13	0	4
	TN	3	3	0	0
5	IL	107	61	46	0
	IN	107	93	0	14
	MI	52	52	0	0
	MN	3	3	0	0
	OH	93	77	0	16
	WI	2	0	0	2
7	IA	15	1	14	0
	KS	3	3	0	0
	MO	9	4	0	5
	NE	2	0	0	2
8	SD	1	1	0	0
9	CA	3	3	0	0
10	AK	1	0	0	1
	OR	3	3	0	0
	WA	11	11	0	0
	Total	**859**	**740**	**67**	**52**



807 **of** **859** **permits have some BMP requirements, including** **740** **with NMC requirements.**

Most NPDES authorities require implementation of BMPs by incorporating appropriate language into permits when reissued. Figure 5.5 shows that NPDES authorities have required implementation of the NMC in 740 of the 859 CSO permits. These requirements are included in 697 permits; 29 require NMC in another enforceable mechanism such as an administrative order. Enforcement actions for NMC requirements are generally the result of a failure to meet a schedule or other requirement prescribed in a permit. For the remaining 14 permits, EPA was unable to determine the mechanism used to require NMC implementation.

NPDES authorities often use discretion to determine the site-specific applicability of each minimum control or best management practice. Specific BMPs may not be required where not applicable or when it is beyond the legal purview of the NPDES authority or the permittee. Examples of this discretion include:

- New Jersey has determined that it cannot legally include requirements to implement the minimum control targeting the review and modification of pretreatment programs in the majority of CSO permits issued to smaller satellite communities. Wastewater treatment in New Jersey is typically provided by regional wastewater treatment authorities serving smaller satellite communities, and the satellite communities typically do not have jurisdiction for the pretreatment program.

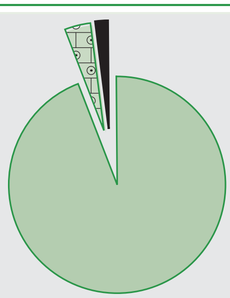
- New York evaluates the applicability of each of its 15 BMPs on a case-by-case basis, and incorporates only those BMPs deemed appropriate into the permit. For example, communities that operate regional wastewater treatment plants handling combined sewage, but that lack responsibility for the collection system, are exempted from implementing a pollution prevention program. Similarly, communities that operate satellite collection systems but that do not own or operate the POTW are not required to develop a WWTP wet weather operating plan.

In cases where the NPDES authority documented a site-specific determination to exclude one or more

Figure 5.5

Mechanism Used to Require NMC Implementation

The majority of NMC requirements are contained in permits. However, 29 permits have an associated enforcement action requiring implementation of the NMC.



Category	#of Permits	Percent
Mechanism to Require NMC		
Permit	697	94.2%
Enforcement Action	29	3.9%
No Data	14	1.9%
Total Permits Requiring NMC	**740**	**100.0%**

of the NMC from a permit, the permit was still included in the 740 considered to include (or to be analogous to) the NMC.

State CSO Program Status

Most states (29 of 32) have established a suite of BMPs for mitigating the impacts associated with CSO discharges. Specifically:

- 25 states require implementation of the NMC.
- Two states (New York and Washington) require a greater number of BMPs than the NMC.
- Two states (Vermont and Iowa) require a set of BMPs less rigorous than the NMC; Iowa adopted the NMC in early 2001 but has incorporated the requirements in only one permit.

Seventeen states require implementation of the NMC (or an equivalent suite of BMPs) in all CSO permits. The most common reasons given by NPDES authorities for not requiring the NMC in every permit include:

- CSO permits are part of NPDES permit backlog and have not been reissued since the publication of the CSO Control Policy in 1994.
- The community committed to sewer separation prior to the issuance of the CSO Control Policy, and the NPDES authority has not required the community to change its approach.

In three states (Alaska, Nebraska, and Wisconsin), CSO permits lack requirements to implement any of the NMC. Together, these states account for less than 1 percent of the CSO permits nationwide (5 of 859). In two of these states (Alaska and Wisconsin), the NPDES authority required significant CSO control activities prior to issuance of the CSO Control Policy. The decision not to establish NMC requirements in these states was made because the CSO communities were well into implementation of CSO controls prior to the issuance of the CSO Control Policy. Both of Nebraska's CSO permits are up for renewal in 2001, and the state has indicated that the reissued permits will contain requirements to implement the NMC. Region 10 has also indicated that it will add requirements to implement the NMC in Alaska's lone CSO permit upon reissuance.

5.2.2 Permit Requirements for LTCP

LTCP Development

As shown in Figure 5.5, 718 (82 percent) of the 859 CSO permits include requirements to develop and implement CSO facilities plans to control CSO discharges. Further, Figure 5.6 shows that 559 of the 718 are required to develop and implement CSO facilities plans that are consistent with the LTCP framework outlined in the CSO Control Policy.

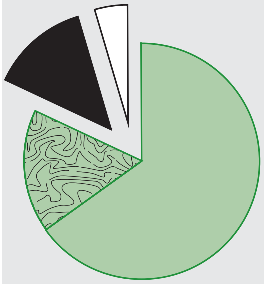
Figure 5.6 also shows that of the 141 permits currently lacking requirements to develop and implement a CSO facilities plan:

- 39 permits are expired and have not been reissued since the inception of the CSO Control Policy.

Figure 5.6

Status of Facility Plan Requirements in CSO Permits

718 CSO permits have requirements to develop and implement a CSO facilities plan. Nearly two-thirds of CSO permits require a facility plan consistent with the LTCP framework outlined in the CSO Control Policy.



Category	#of Permits	Percent
Permit Requires LTCP	559	65.1%
Permit Requires Facility Plan[1]	159	18.5%
Permit Does Not Require Facility Plan		
Reissued Without Requirements	102	11.9%
Not Reissued Since 1994	39	4.5%
Total Permits	**859**	**100.0%**

[1]Includes plans for complete separation.

- 102 permits have been reissued since the CSO Control Policy without requirements to develop a CSO facilities plan.

Most NPDES authorities require LTCP development by incorporating appropriate language into permits at reissuance. Figure 5.7 shows that NPDES authorities have required LTCP development in 559 of the 859 CSO permits. These requirements are included in 457 permits; 102 require LTCP development through another enforceable mechanism such as an administrative order. Enforcement actions generally result from one of two sets of circumstances:

- CSO discharges cause or contribute to an exceedance of applicable water quality standards, and therefore a water quality-based effluent limit (in this case LTCP requirements) is necessary. If the permittee is unable to immediately comply with the LTCP requirements, an enforcement order is issued concurrently with the permit, including a schedule requiring the development and implementation of an LTCP.
- Failure to meet a compliance schedule or other requirement prescribed in a permit.

The majority of enforcement actions related to LTCP development and implementation are in states where the NPDES authority asserts that all CSO discharges have the reasonable likelihood to cause or contribute to nonattainment of water quality standards. These include Region 1(the

Figure 5.7

Mechanism Used to Require LTCPs

Most requirements to develop and implement an LTCP are issued in permits, but 18 percent of LTCP requirements are part of an enforcement order. Notably, several states use enforcement orders, rather than permits, to require LTCP development and implementation.

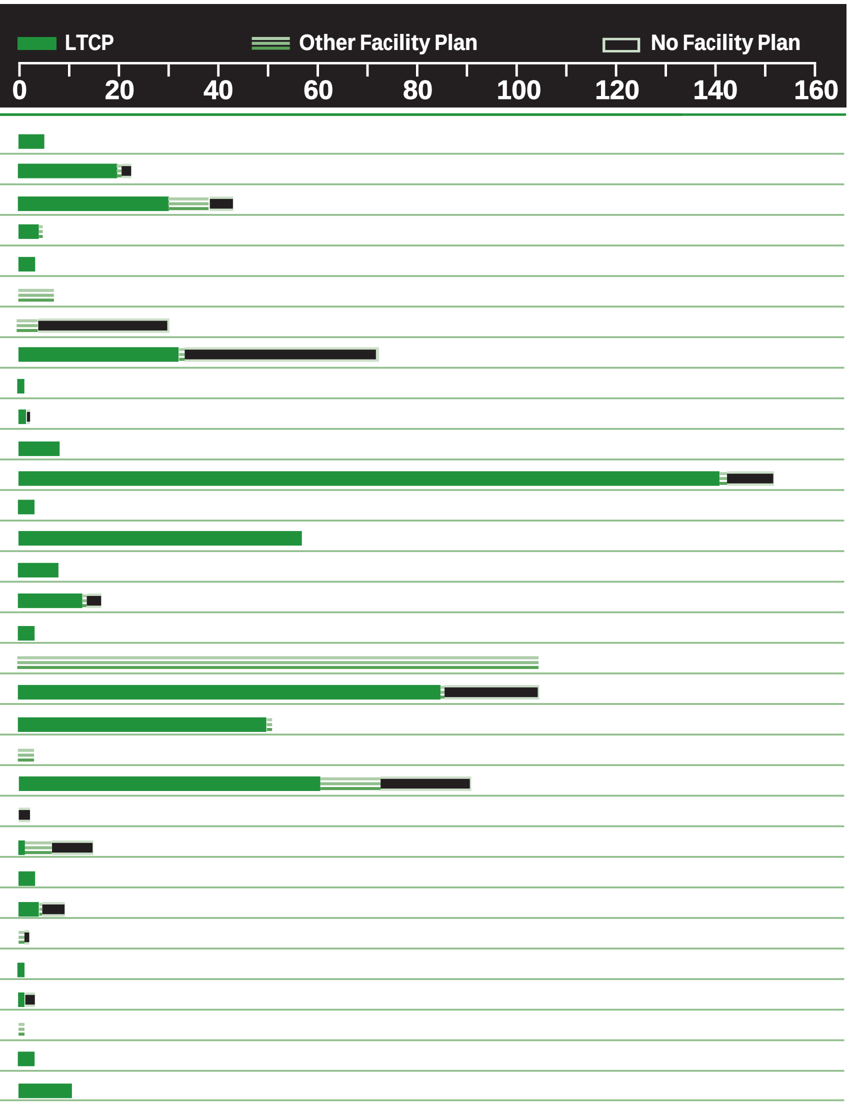
Category	#of Permits	Percent
Mechanism to Require LTCP		
Permit	457	81.8%
Enforcement Action	102	18.2%
Total Permits Requiring LTCP	**559**	**100.0%**

Figure 5.8

CSO Permits With Requirements to Develop and Implement an LTCP

31 of 32 states have a framework for CSO control planning; of these , 25 states have frameworks consistent with the CSO Control Policy.

Region	State	# Permits	LTCP	Other Facility Plan	No Facility Plan
1	CT	5	5	0	0
	MA	23	20	1	2
	ME	44	31	8	5
	NH	5	4	1	0
	RI	3	3	0	0
	VT	7	0	7	0
2	NJ	31	0	4	27
	NY	74	33	1	40
3	DC	1	1	0	0
	DE	2	1	0	1
	MD	8	8	0	0
	PA	155	144	2	9
	VA	3	3	0	0
	WV	58	58	0	0
4	GA	8	8	0	0
	KY	17	13	1	3
	TN	3	3	0	0
5	IL	107	0	107	0
	IN	107	87	1	19
	MI	52	51	1	0
	MN	3	0	3	0
	OH	93	62	13	18
	WI	2	0	0	2
7	IA	15	1	6	8
	KS	3	3	0	0
	MO	9	4	1	4
	NE	2	0	1	1
8	SD	1	1	0	0
9	CA	3	1	0	2
10	AK	1	0	1	0
	OR	3	3	0	0
	WA	11	11	0	0
	Total	**859**	**559**	**159**	**141**



718 of 859 permits have facility plan requirements, including 559 permits requiring LTCPs.

NPDES authority for Massachusetts and New Hampshire), Vermont, Maine, and Maryland.

Figure 5.8 provides a state-by-state summary of the number of CSO permits with requirements to develop and implement a CSO facilities plan. It highlights states in which requirements for facilities planning are consistent with the LTCP framework outlined in the CSO Control Policy.

State CSO Program Status

Most states (31 of 32) have established a framework for CSO facilities planning to meet the water quality-based requirements of the CWA for CSOs. Of these 31:

- 25 have established a framework that includes the LTCP components outlined in the CSO Control Policy.
- Five (Alaska, Illinois, Minnesota, Vermont, and Wisconsin) require engineering design studies for CSO facilities plans and, often, achieved implementation of significant CSO control prior to issuance of the CSO Control Policy.
- One (New Jersey) is awaiting completion of its TMDL process (i.e., planning on a watershed basis) before implementing additional CSO controls, rendering separate LTCPs unnecessary.
- Only Nebraska has established no framework for CSO facility planning. Both of Nebraska's CSO permits are up for renewal in 2001. The state has indicated that the reissued permits will contain requirements for LTCP development and implementation.

In most of the 25 states requiring LTCPs, formal LTCP requirements mirror the CSO Control Policy and offer two bases for LTCP development (the presumption approach and the demonstration approach). Several states, however, have advocated a preferred approach for CSO control. These approaches include:

- 85 percent capture, by volume, as included in the definition of the presumption approach.
- Transporting all wet weather flows to the POTW for minimum treatment prior to discharge.
- Capacity to provide treatment for flows generated by a specific design storm.
- Sewer separation.

Sixteen states require development and implementation of a CSO facilities plan in all CSO permits. The most common reasons given by NPDES authorities for not requiring LTCP development and implementation in a CSO permit include:

- Long-term CSO control planning efforts are beyond the financial or technical capabilities of small communities.
- CSOs are not a top permitting priority, given a limited number of CSOs and competing programs

such as TMDLs, urban storm water, and agricultural runoff.

- CSO permits are part of the NPDES permit backlog and have not been reissued since issuance of the CSO Control Policy in 1994.

5.3 Water Quality Standards

The CWA provides flexibility to water quality standards authorities to adapt water quality standards to reflect site-specific conditions, including those related to CSOs. Further, the CSO Control Policy anticipates:

> *... the review and revision, as appropriate, of water quality standards and their implementation procedures when developing CSO control plans to reflect site-specific wet weather impacts of CSOs.*

The CSO Control Policy expected that permit writers would promote coordination between permittees and water quality standards authorities during the development of the LTCP. This coordination was expected to facilitate the review of water quality standards and, if appropriate, their revision, based on site-specific impacts of CSOs and the implementation of CSO controls that would ultimately support the attainment of water quality standards.

EPA's water quality standards regulations provide that designated uses can be removed only if a reasonable basis exists for determining that (1) current designated uses cannot be attained after implementing the technology- and water quality-based controls required by the CWA and (2) that the current designated uses are not existing uses. In determining whether a use is attainable, the regulations require that the state conduct and submit a use attainability analysis (UAA). The UAA is a structured scientific assessment of the physical, chemical, biological, and economic factors affecting the attainment of the use in a water body.

Another option available to states for modifying water quality standards is the adoption of a variance. A variance is a temporary change (generally three to five years, with renewals possible) to the water quality standard. The variance is specific to a discharger for a particular pollutant. The variance does not relieve other dischargers along a common water body segment from any requirement to provide necessary treatment to attain water quality standards. When adopting a variance, the state must determine that:

- The designated use is not an existing use.
- The designated use is not immediately attainable with implementation of the technology-based controls of the Clean Water Act and with reasonable, cost-effective BMPs to control nonpoint sources.
- The designated use is not attainable during the duration of the variance based on any of the factors in 40 CFR 131.10(g)(1)(6).

Since the underlying designated use remains, and further environmental

Sailing in Milwaukee Harbor, WI. During LTCP development the CSO Control Policy expects states and CSO communities to collect data to characterize the receiving water. This data may then be used to support the review of water quality standards.

Photo: EPA

progress can be attained with the implementation of the LTCP, the rigor of the analyses and the level of demonstration used for a variance are generally less than those required for a permanent change in the use. Because a variance is a change in the water quality standards, however, the same requirements apply for a variance as for a new or revised standard (e.g., an opportunity for public review and comment, and EPA approval or disapproval of the variance).

5.3.1 Integrating Water Quality Standards Review with LTCP Development and Implementation

The implementation of CSO controls identified in a well-designed and operated LTCP may lead to the determination that a water body has the potential of supporting improved aquatic life. Under this circumstance, states would upgrade their designated aquatic life use for the water body. Alternatively, implementation of CSO controls may not necessarily ensure the attainment of water quality standards within the CSO receiving water. During LTCP development, the CSO Control Policy expects states and CSO communities to collect data to assess baseline conditions in the receiving water and evaluate the potential effectiveness of any proposed controls in improving water quality and supporting the uses of the water body. If the data show that even with the installed controls, CSOs will continue to contribute to the impairment of water quality standards, the NPDES authority is expected to work with the CSO community to evaluate other CSO control alternatives. If, however, chemical, physical, or economic factors appear to preclude attainment of the use, the data collected during the LTCP development process may be used to support revisions to water quality standards. Revisions could include adoption of uses that better reflect the water quality that can be achieved with a level of CSO control that does not cause substantial and widespread economic and social impact.

In the seven years since EPA issued the CSO Control Policy, coordination of LTCP development and implementation with water quality standards reviews has not progressed as quickly as expected. Therefore, at the urging of Congress, EPA recently published *Guidance: Coordinating CSO Long-term Planning with Water Quality Standards Reviews* (EPA, 2001c), as discussed in Section 4.5 of this report.

5.3.2 State Approaches for Reviewing Water Quality Standards for CSO Receiving Waters

A few states have developed approaches reconciling their water quality standards with overflows that will remain after the implementation of a well-designed CSO LTCP. Summaries of the actions taken by the states are provided below.

Indiana

All waters in Indiana are designated for full-body contact recreational use and for support of a well-balanced aquatic community. State Senate Enrolled Act (SEA) 431, enacted on March 17, 2000, provides a mechanism whereby CSO

Augusta, capital of Maine—one of several states to have developed procedures for coordinating water quality standards reviews with LTCP development. Maine is currently in the process of developing implementation procedures for its process.

Photo: Photodisc

communities may apply for a temporary suspension of designated use, provided the criteria set forth in the statute are met. These criteria include:

- Determining the designated use to be suspended, and the existing use for the water body.
- Identifying all uses and sensitive areas.
- Identifying stakeholders and organizing a citizens' advisory committee.
- Documenting plausible alternatives for CSO control.
- Determining how quickly the CSO community can afford to implement the selected CSO control alternative.
- Developing an implementation schedule.
- Conducting a UAA to demonstrate that attaining the designated use is not feasible due to one of the six factors listed in 40 CFR 131.10(g).
- Committing to periodically reviewing the LTCP to implement cost-effective control alternatives.

The Indiana Department of Environmental Management (IDEM) released a final draft *Combined Sewer Overflow (CSO) Long-Term Control Plan Use Attainability Analysis Guidance* in April 2001 (IDEM, 2001). The guidance is for CSO communities interested in seeking temporary suspensions under SEA 431 while implementing an LTCP.

Maine

Maine worked with stakeholders to develop modifications of the state's water classification program to allow CSO communities to request a variance that includes temporary CSO subcategories. The site-specific CSO subcategories remove designated uses for short periods of time after wet weather events and snowmelt in areas affected by CSOs. This allows CSO communities to continue to make progress in solving CSO problems without violating state water quality standards. The Maine Legislature enacted the legislation in 1995.

Highlights of the law include:

- CSO subcategories allow for temporary removal of designated but not existing uses impacted by CSOs. Each subcategory includes an area and a time duration. CSO communities submit flow and load data to the state to assist in the determination of subcategory area and duration.
- Prior to applying for CSO subcategories, CSO communities must have approved LTCPs. LTCPs must place a high priority on abatement of CSOs that impact waters with the greatest potential for public use or benefit, and must contain an implementation schedule for CSO abatement. The LTCP will be considered the UAA.
- During, or following, development of the LTCP, the CSO community will conduct public hearings to

gain input from stakeholders on the areas affected by the variance. If the variance is approved, the CSO community must provide public notice describing limitations on use of the water body.

- Approval of a CSO subcategory does not relieve other dischargers from any requirement to provide necessary treatment to comply with water quality standards.

Maine will periodically review all CSO subcategories. If the CSO community fails to comply with the implementation schedule in its approved LTCP, the variance may be revoked and the state may take enforcement action for permit violations. Maine received a 104(b)(3) grant from EPA in FY 2001 to develop implementation procedures for the 1995 legislation and to pilot test its application.

Massachusetts

Massachusetts amended its water quality standards in 1996 to include a CSO subclassification in its use classification system for receiving waters with substantial numbers of CSO outfalls. The application of a CSO subclassification requires EPA approval of a UAA. Massachusetts uses the UAA to evaluate the attainability of the designated use, particularly whether CSO controls would likely cause substantial and widespread economic and social impact.

For example, the Class B (CSO) subclassification requires that CSO controls be sufficient to meet water quality standards 95 percent of the time, generally no more than four CSOs per year. A UAA must be developed that demonstrates achieving greater than 95-percent control would cause substantial and widespread economic and social impact. The commonwealth must make the UAA available for public review and comment and receive EPA approval prior to applying the Class B (CSO) subclassification to a particular water body. The standard suspends only the bacteriological criteria; toxic pollutants are not affected.

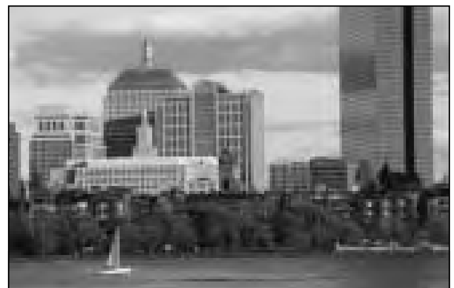
To date, only the Massachusetts Water Resources Authority (provider of water and sewer services to the greater Boston metropolitan area) has completed a UAA and justified the need for a CSO subclass.

Other State Approaches

- Illinois' existing water quality standards program framework presumes compliance with water quality standards upon the completed implementation of a CSO facility plan that meets the criteria for the state-derived presumption approach.

- Michigan rules allow the use of alternate design flows (i.e., alternate to 7Q10 low flows or 95% exceedance flows) when determining water quality-based requirements for intermittent wet weather discharges such as treated combined sewer overflows.

- New Hampshire has also developed a surface-water partial-use designation called Temporary Partial Use (TPU) or Class B (TPU). A designation of Class B



Massachusetts has developed subclassifications for receiving waters with different numbers of CSO outfalls. Communities must complete a UAA to qualify for a subclassification. To date, only the Metropolitan Water Resources Authority, which serves the Greater Boston area, has completed a UAA.

Photo: Photodisc

(TPU) is made only if the community planning process, watershed planning efforts and a UAA demonstrate that the allowance of minor CSO discharges is the most environmentally protective and cost-effective option available. Furthermore, this designation is only allowed in "non-critical resource areas." Critical areas would include beaches, shellfish habitats, drinking water intakes, and endangered species habitats.

- Four communities in Ohio have requested water quality standards reviews and submitted biological monitoring data as part of their CSO control plans. The state conducted the reviews but made no changes in standards as a result of these reviews.

- Pennsylvania has indicated that it does not currently intend to review water quality standards in conjunction with LTCP development and implementation, but will explore water quality standards reviews in their next triennial review.

5.3.3 State Water Quality Assessment Reports

Urban water quality may be affected by a combination of CSOs, storm water discharges, other point sources and nonpoint source runoff. The CSO Control Policy encourages permitting authorities to:

> *... evaluate water pollution control needs on a watershed management basis and coordinate CSO control efforts with other point and nonpoint source control activities.*

Section 303(d) of the CWA establishes the TMDL process. The TMDL process provides a mechanism for integrating the management of both the point and nonpoint pollution sources that may contribute to a water body's impairment. In addition, the TMDL process can be used to expedite water quality-based NPDES permitting and can lead to technically sound and legally defensible decisions for attaining and maintaining water quality standards.

Under the authority of Section 303(d), states are expected to develop TMDLs for water quality-limited waters where technology-based effluent limitations or other legally required pollution control mechanisms are not sufficient or stringent enough to implement the applicable water quality standards. As part of this effort, every two years states submit a report to EPA identifying water quality-limited waters still needing TMDLs, including a priority ranking of water bodies. A summary, by state, of the number of water segments impacted by CSOs is included in Appendix N.

5.4 Compliance and Enforcement

5.4.1 Policy

Many states have issued compliance and enforcement policies to coordinate regulatory activities and to inform municipalities of compliance expectations and enforcement consequences. Based on available information, state CSO compliance and enforcement policies can be grouped into three categories:

- Enforcement policies promulgated by the state.
- Enforcement policies resulting from state participation in the National Environmental Performance Partnership System (NEPPS).
- Enforcement initiatives based on EPA policies.

State-promulgated and state NEPPS-based CSO policies are discussed below.

State-Promulgated CSO Enforcement Policies

Georgia, Indiana, Iowa, New Hampshire, Ohio, Pennsylvania, Rhode Island, Vermont, and West Virginia each promulgated CSO enforcement policies. The CSO policies of Indiana and Ohio illustrate the range of approaches taken by state CSO enforcement authorities.

- Indiana's Final Combined Sewer Overflow Strategy, issued in 1996, is intended to bring Indiana's CSOs into compliance with the requirements of the CWA and Indiana's goal of all state surface waters meeting water quality standards by 2005. Indiana's Strategy recommends that CSO enforcement activities focus on: enforcement of the dry weather overflow prohibition, CSO permit documentation requirements, and the state's minimum water quality criteria.
- Ohio's 1995 CSO Strategy includes a dry weather overflow prohibition. The Strategy recommends that Notices of Violation (NOV) be issued for occasional dry weather overflows and the use of administrative or judicial actions to eliminate dry weather overflows. Ohio's strategy also suggests several enforcement mechanisms to enforce CSO permits. These include NOV to address violations of interim schedule dates not affecting final deadlines, as well as administrative or judicial actions to address major delays in meeting interim schedule dates.

State CSO Enforcement Policies Based on the NEPPS

The objectives of the NEPPS include:

- Facilitating joint EPA and state planning and priority setting.
- Providing states with greater flexibility with regard to resource allocation.
- Fostering the use of integrated and innovative strategies for addressing natural resource questions.

In order to implement NEPPS, states and their respective EPA regional offices develop a Performance Partnership Agreement (PPA). PPAs are designed to detail joint priorities and methodology for implementation of NEPPS at the state level.

In Alaska, Connecticut, Illinois, Massachusetts, and Wisconsin, state CSO policies grew out of NEPPS

Ohio EPA initiated an enforcement action against the City of Akron in 1995 for violations of the CWA related to CSO discharges to the Cuyahoga River. Akron continues its efforts to implement CSO controls, including storage/conveyance tunnels, sewer separation projects, and detention basins.

Photo: City of Akron Bureau of Engineering Services

The State of New York has primary responsibility for inspection of CSO communities, such as New York City. The State has its own inspector training system and uses an inspection tracking system independent of the NPDES PCS data base.

Photo: Photodisc

agreements with EPA. Examples include:

- The PPA between Connecticut and EPA for FY 2000 and 2001 addresses POTWs and municipal sewerage systems in general, as well as CSOs, and authorizes the state to perform CSO inspections. In the past, NOVs were only issued to POTWs for effluent limit violations. As a result of Connecticut's PPA, however, the state's enforcement program is working to include all permit violations, such as those occurring during sample collection and analyses, record keeping, bypass reporting, and illegal discharges.

- Illinois' FY 2001 PPA with EPA recommends that EPA use a "place-based" approach (e.g., considering greater Chicago as one entity) in directly assisting Illinois. EPA's goal is to ensure that its resources, as well as the state's, are optimized. Toward that end, that PPA recommends that EPA provide direct assistance in the following areas: performance of wet-weather inspections, with emphasis on CSO and SSO inspections; pretreatment POTW seminars; and facilitation of seminars for industrial users.

5.4.2 State Inspections

States conduct most NPDES inspections. State-initiated CSO inspections of municipal facilities often are part of an overall NPDES compliance inspection (see Section 4.4 of this report). CSO-specific inspections may result from citizen complaints, discrepancies in discharge monitoring reports, routine reviews, or other sources. State-level CSO inspection programs either are wholly state administered or are collaborations between a state and an EPA region, and may be part of an enforcement investigation or the result of an enforcement action (e.g., notice of violation). With the exception of Nebraska, CSO inspections have been conducted in all states with CSO permits. The various state inspection programs are characterized in Appendix O.

State-Administered CSO Inspections

California, Iowa, Kentucky, Michigan, Minnesota, New Jersey, New York, Oregon, South Dakota, Tennessee, Virginia, and Washington have primary responsibility for the administration and implementation of CSO compliance inspection programs. For example:

- New York conducts inspections through its regional offices. New York has its own inspector training program and has a listing of guidance documents in its Technical & Operational Guidance Series (TOGS). TOGS provides users a link to the Integrated Compliance Strategy System, which is the state's plan for dealing with wet weather issues. New York maintains an inspection tracking system independent of PCS. The state uses this system to identify facilities to be inspected and to determine enforcement activities. Although New York participates in quarterly significant non-compliance teleconferences with Region 2, the state has primary responsibility for CSO inspection and control.

- Iowa is responsible for CSO inspections. Iowa offers inspector training, schedules inspections, and tracks inspection activities in a state matrix. These inspections have not focused on CSOs and compliance with the CSO Control Policy.

- Kentucky has NPDES enforcement authority and conducts regular inspections of NPDES permittees. The inspections have not focused on CSOs and compliance with the CSO Control Policy. Region 4 has assisted Kentucky in some CSO inspections emphasizing compliance with the NMC. The region also visits Kentucky on an annual basis in order to coordinate CSO activities with the state.

- Michigan conducts its NPDES inspections, which include a state-developed evaluation of CSO facilities, through its eight regional offices. CSO data are tracked in regional databases overseen by the state. Michigan is working with Region 5 to expand its CSO inspection program efforts to include federal concerns and ensure a uniform inspection approach throughout the region.

State- and EPA-Administered CSO Inspections

Alaska, Delaware, Georgia, Illinois, Indiana, Kentucky, Maine, Massachusetts, Nebraska, New Hampshire, Ohio, Pennsylvania, Vermont, and West Virginia each have cooperative agreements with EPA regarding CSO and NPDES inspections. Examples of these types of agreements include:

- Ohio's NPDES inspections follow the procedure recommended in the *NPDES Compliance Inspection Manual* (see Section 4.5.1 of this report). These inspections address CSOs and are conducted annually with Region 5. When resources allow, Ohio and Region 5 undertake joint inspections of NPDES facilities. When Ohio is unable to inspect all identified facilities within the agreed time, Region 5 will administer some inspections. Following an inspection, any follow-up information is entered into a data base Ohio uses to track inspections and compliance activities. Information from these data bases is fed into PCS. Ohio is coordinating with Region 5 to have its inspectors take part in the regional CSO inspector training program.

- Georgia has three CSO communities. One is the City of Atlanta, which is under a consent decree to bring its CSO facilities into compliance with the CWA and the Georgia Water Quality Control Act. Georgia and Region 4 performed joint inspections of the Atlanta CSO facilities and worked cooperatively in developing the federal court-ordered consent decree. Georgia and Region 4 work together to monitor the progress of the consent decree and conduct inspections. Georgia conducts inspections in its other two CSO communities.

- Indiana, by agreement with Region 5, conducts 75 percent of the state's NPDES inspections at CSO sites and the region conducts the remaining 25 percent. Indiana cooperates closely with Region 5 regarding CSO inspections. Indiana, for example, sends its inspectors to the region for training, uses regional guidance documents and checklists, and participates in teleconferences with the region to discuss cases of significant non-compliance. Indiana also coordinates with Region 5 to determine the components of its CSO inspection checklist.

- Massachusetts meets with Region 1 on a quarterly basis to discuss CSO inspections and the results of those inspections. The state has a PPA with the region under which funds are shared to help Massachusetts keep facilities in compliance with regulations, including the CSO Control Policy.

- Vermont follows EPA guidance about inspections and has a relationship with Region 1 whereby the region conducts inspections when Vermont is unable to do so. Vermont and the region communicate quarterly about major facilities that will be inspected and what the level of inspection should be at each.

CSO Inspections Prompted by Enforcement Activities

State CSO inspections also may occur in response to enforcement activities. CSO inspections in Georgia, Pennsylvania, and Washington have resulted from this process.

5.4.3 CSO Enforcement Activities

For this report, EPA reviewed individual NPDES permit compliance information and performed a Lexis-Nexis search to document state enforcement activities. This process identified 136 state-initiated enforcement actions (primarily administrative actions, such as administrative compliance orders) that include CSO violations. This number is an estimate, as EPA was unable to verify each state action that included CSO violations. Documentation of state CSO enforcement activities was not completed in a uniform manner, so dates for all settlements were unavailable. A summary of available information regarding state-initiated CSO enforcement actions is presented in Appendix P.

Although some states (e.g., Massachusetts) have not initiated administrative or civil judicial actions against CSO violations, they formally join EPA in its actions and/or become involved in the review and approval of LTCPs, water quality standards review, and oversight of implementation of subsequent CSS improvements.

Administrative and Other Enforcement Actions

States enforce CSO compliance in a variety of ways. Water-quality effluent limit violations and failures to meet compliance schedules have been the most common reasons for state-initiated enforcement actions. Based on available information, most states have initiated administrative enforcement actions to address CSO violations. A list of 92 administrative actions is included in Appendix P.

Civil Judicial Actions

EPA's review of available state-initiated CSO enforcement cases revealed one CSO civil judicial action. The case is listed in Appendix P.

Other State Enforcement Actions

Forty-three CSO facilities have been subject to enforcement actions resulting from state actions or joint state-EPA actions. The majority of cases are administrative actions resulting in an administrative order. Summaries of these cases are included in Appendix P.

5.5 Guidance, Training and Compliance and Technical Assistance

Most guidance and compliance assistance documents being used by NPDES authorities and CSO communities have been produced by EPA (see Section 4.2.1). However, some states have produced permit boiler-plate language for CSOs addressing issues related to implementation of their CSO program. Some states have also developed training programs to assist their staff in administering CSO programs. The following sections discuss some of these state specific materials.

5.5.1 Guidance

In many cases, NPDES authorities developed standard language to include in NPDES permits to address CSOs and incorporated this language into guidelines for CSO permit writers. For example, Region 1 developed a policy memorandum that included draft fact sheet language for CSO permits, model permit language, and guidance on documenting and implementing the NMC (Region 1, 1996). This information is used in CSO permits in Massachusetts and New Hampshire (and previously in Maine), where Region 1 is the NPDES authority.

Other cases in which permitting authorities have developed documents to assist in implementation of the CSO Control Policy include the following:

- Maine developed a guidance document, *Program Guidance on Combined Sewer Overflow Facility Plans*, that provides information on monitoring, selection of BMPs, and development of a CSO master plan (the functional equivalent of an LTCP).

- Michigan produced a 1994 *Combined Sewer Overflow Control Program Manual* (MDNR, 1994) to assist staff in implementation of the state's CSO permitting strategy. The manual provides detailed information on Michigan's CSO program. It also contains a discussion of the elements needed to implement the program and guidance on determining compliance.

- Pennsylvania developed a strategy document that defines the state program and approach, discusses permitting options for small and large POTW and satellite communities, explains special exemptions from LTCP requirements, establishes an implementation strategy, and provides an enforcement policy for the program.

In addition to compliance and enforcement inspections, New Jersey provides CSO communities with onsite consultations and technical assistance services. The state is developing a manual to provide state and local inspectors with standard operating procedures.

NJ Department of Environmental Protection

5.5.2 Training

Some permitting authorities have sponsored workshops and training courses. For example:

- Pennsylvania has offered CSO workshops for small communities. The workshops served as a forum for better communicating CSO program requirements, answering questions from CSO communities, and providing an opportunity for CSO communities to voice concerns to the state.

- New York provides training for operators of municipal facilities in conjunction with EPA. This program includes training specifically for operators of facilities served by combined sewer systems. New York also provides a number of services to its inspectors and CSO communities, including: training materials and on-site assistance for developing effective wet-weather operating plans; the Technical & Operational Guidance Series website; and an Integrated Compliance Strategy System that collects information on New York's entire compliance assistance program.

- Illinois offers a wastewater operator certification program that includes CSO operator certification. Illinois' website also provides links to other providers of certification training.

5.5.3 Compliance and Technical Assistance

Compliance assistance includes on-site assistance, website materials, and distribution of outreach materials to support compliance with regulatory requirements. EPA's review found that a limited number of CSO states provide compliance assistance to help communities meet CSO permit requirements.

A review of websites for states with CSO discharges (Table 5.4) indicated that even states with relatively large numbers of CSO communities did not have CSO compliance information readily available. A few states, however, have programs to assist communities with CSO compliance.

The five states highlighted below offer CSO inspection guidance, and technical assistance.

- Maine trains its inspectors to perform all aspects of wet weather control.

Table 5.4

Online Information Resources

State environmental agencies offer communities a range of information resources including fact sheets, compliance checklists, information on water quality standards, etc. This list contains links to agency home pages as well as links to CSO information pages, where available.

Region	State/Territory	CSO-Related Internet Site(s)
1	CT	http://dep.state.ct.us/index.htm
		http://dep.state.ct.us/wtr/index.htm
	ME	http://www.state.me.us/dep/blwq/engin.htm#engin
	MA	http://www.state.ma.us/dep/dephome.htm
	NH	http://www.des.state.nh.us/water_intro.htm
		http://www.des.state.nh.us/factsheets/wwt/web-9.htm
	RI	http://www.state.ri.us/dem/
		http://www.state.ri.us/dem/programs/benviron/water/quality/index.htm
	VT	http://www.state.vt.us/wtrboard/
2	NJ	http://www.state.nj.us/dep/
		http://www.state.nj.us/dep/dwq/
	NY	http://www.dec.state.ny.us/
		http://www.dec.state.ny.us/website/dow/index.html
3	DE	http://www.dnrec.state.de.us/dnrec2000/
	MD	http://www.mde.state.md.us/index.html
	PA	http://www.dep.state.pa.us/dep/deputate/watermgt/wsm/facts/fs2655.htm
	VA	http://www.deq.state.va.us/
		http://www.deq.state.va.us/water/
	WV	http://www.dep.state.wv.us/
	DC	http://www.environ.state.dc.us
4	GA	http://www.ganet.org/dnr/environ/
	KY	http://www.nr.state.ky.us/nrepc/dep/dep2.htm
	TN	http://www.state.tn.us/environment/
		http://www.state.tn.us/environment/water.htm#Program
5	IL	http://www.epa.state.il.us/
	IN	http://www.state.in.us/idem/
		http://www.state.in.us/idem/water/facmang/compliance.html
	MI	http://www.deq.state.mi.us/
		http://www.deq.state.mi.us/swq/cso%5Fsso/cso%5Fsso%5Findex.html
	MN	http://www.pca.state.mn.us/water/index.html
		http://www.pca.state.mn.us/water/stormwater.html
	OH	http://www.epa.state.oh.us/oepa.html
	WI	http://www.dnr.state.wi.us/environmentprotect/water.html
7	IA	http://www.state.ia.us/government/dnr/organiza/epd/comp_enf/index.htm
		http://www.state.ia.us/government/dnr/organiza/epd/wastewtr/wastwtr.htm
	KS	http://www.kdhe.state.ks.us/
		http://www.kdhe.state.ks.us/water/index.html
	MO	http://www.dnr.state.mo.us/deq/homedeq.htm
		http://www.dnr.state.mo.us/deq/wpcp/homewpcp.htm
	NE	http://www.deq.state.ne.us/
8	SD	http://www.state.sd.us/denr/denr.html
9	CA	http://www.swrcb.ca.gov/
10	AK	http://www.state.ak.us/dec/deh/water/drinking.htm
	OR	http://www.deq.state.or.us/wq/
	WA	http://www.ecy.wa.gov/
		http://www.ecy.wa.gov/programs/wq/wqhome.html

- Illinois provides a CSO inspection checklist in conjunction with Region 5.
- Indiana provides a CSO inspection checklist in conjunction with Region 5.
- New Jersey is developing an inspection manual to provide state and local inspectors with standard inspection operating procedures.
- Pennsylvania trains its inspectors twice each year and provides a compliance manual for use as guidance.

5.6 Communication and Coordination

The CSO Control Policy expects that the permit writer should play a critical role in the development and implementation of CSO controls. The permit writer is expected to coordinate with the CSO community, review interim LTCP deliverables and other submissions, and participate in the consensus-building process with other stakeholders. The permit writer is also expected to serve as the point of contact for coordination with state water quality standards and enforcement authorities, as appropriate.

5.6.1 Communication

Within an NPDES authority, the organizational structure to support full implementation and enforcement of all aspects of the CSO Control Policy is often decentralized. Some NPDES authorities (e.g., Michigan, New York, Pennsylvania) have regional offices with varying degrees of responsibility for the development, implementation, and enforcement of the NPDES program. In some states (e.g., Illinois, Massachusetts, Vermont, West Virginia), responsibility for the water quality standards program is in an agency distinct and separate from the NPDES authority. The permit writer's responsibility is to ensure open and informed lines of communication among all interested parties.

Many NPDES authorities use electronic spreadsheets and databases to track the status of efforts by CSO communities to develop and implement NMC and LTCP. These electronic files are easily shared across programs and offices, thereby facilitating communication. Examples of CSO tracking systems developed by NPDES authorities are presented in Appendix Q.

5.6.2 Coordination

Several NPDES authorities have undertaken coordination of the activities of CSO communities discharging to the same receiving water. EPA's *Combined Sewer Overflows Guidance for Permit Writers* offers:

> *The permit writer may also be able to assist communities in coordinating aspects of its CSO control programs with each other. This might be particularly beneficial for adjacent communities discharging to the same receiving water.*

Examples of actions by NPDES authorities to coordinate the activities of CSO communities discharging to the same receiving water are presented in the following summaries.

- New Jersey uses a watershed process to develop watershed restoration plans that include CSO controls. During the watershed process, water quality standards and uses are considered as management responses are developed. Possible management responses include TMDLs, LTCP development and implementation, and other appropriate activities.

- New York determined that the nine CSO permits with outfalls impacting the Hudson River in the vicinity of Albany should be modified simultaneously. The concurrent modification of these permits is intended to promote comprehensive and coordinated planning.

- Region 3, working with the Water and Sewer Authority for the District of Columbia, organized a Special Panel on Combined Sewer Overflows and Storm Water Management in the District of Columbia. The Special Panel provided an opportunity for federal land holders and other local and regional multi-jurisdictional government agencies to provide input and recommendations for CSO control within the District of Columbia. The Special Panel highlighted the need for implementation of a watershed approach and cooperation with Maryland to improve water quality within the District of Columbia.

5.7 Financial Assistance

NPDES authorities are concerned with two primary financial obligations with regard to CSOs: funding the state program's operation and assisting CSO communities in securing funds necessary to implement CSO control.

The primary mechanism for funding state CSO programs is the federal assistance EPA provides to NPDES authorities and other agencies responsible for implementing water pollution control programs through Section 106 Water Pollution Control Program Grants. These grants are discussed in Section 4.8.3 of this report. No state-level data exist on grant totals or prioritization of grants for specific programs.

State-level data exist for the appropriation of categorized listings for the State Revolving Fund (SRF). The SRF is a low-interest loan program administered by the states but funded by the federal government and the states. CSO municipalities are eligible for SRF funding under a special combined sewer category (Category V). Between 1988 and 2000, over $2.0 billion was identified as being used for CSO projects.
Figure 5.9 shows trends in SRF loans for CSO projects over time. This general pattern suggests that demand for SRF loans for CSO control associated with the 1989 National CSO Control Strategy and the 1994 CSO Control Policy may have lagged the issuance of these documents by a few

years. It also suggests that the demand for SRF loans for CSO projects will continue to increase as more CSO communities work to implement LTCPs.

From 1988 to 1994 (pre-CSO Control Policy), over $700 million in SRF loans was used for Category V projects. Since 1994, over $1.3 billion has been used for Category V projects. Figure 5.10 shows the distribution of the SRF money by state. Over both these periods, Illinois, Michigan, and New York have the highest SRF money loaned for CSO projects. Since 1995, many states requested noticeably higher levels of SRF money for CSO projects (indicative of controls from the strategies and policies being put in place). A notable decline in SRF Category V loans can be seen in Vermont (approximately $19 million less between 1995-2000, than 1988-1994). This reduced level of SRF funding reflects that Vermont's CSO program focused on sewer separation and is nearing completion, with 20 of 27 CSO communities having completed sewer separation projects.

Most states have state funding and administered grant and loan programs other than the SRF loan programs. Many of these programs include provisions for infrastructure or wastewater projects that may also be used for CSO projects. Examples of state-specific programs targeted to CSOs include:

- Maine's grant program funds up to 25 percent of the cost for completion of CSO Master Plans (the functional equivalent of an LTCP) to encourage communities to identify CSO control alternatives.
- Connecticut has a provision that allows for CSO projects to receive a 50-percent grant and a 50-percent SRF loan. Non-CSO

Figure 5.9

SRF Loans for CSO Projects,1988—2000

SRF loans for CSO projects reached more than $245 million in 1994 and began to rise again in 1998, reaching more than $400 million in 2000. This suggests that funding for the implementation of CSO controls lagged several years behind the issuances of the 1989 Strategy and the 1994 Policy.

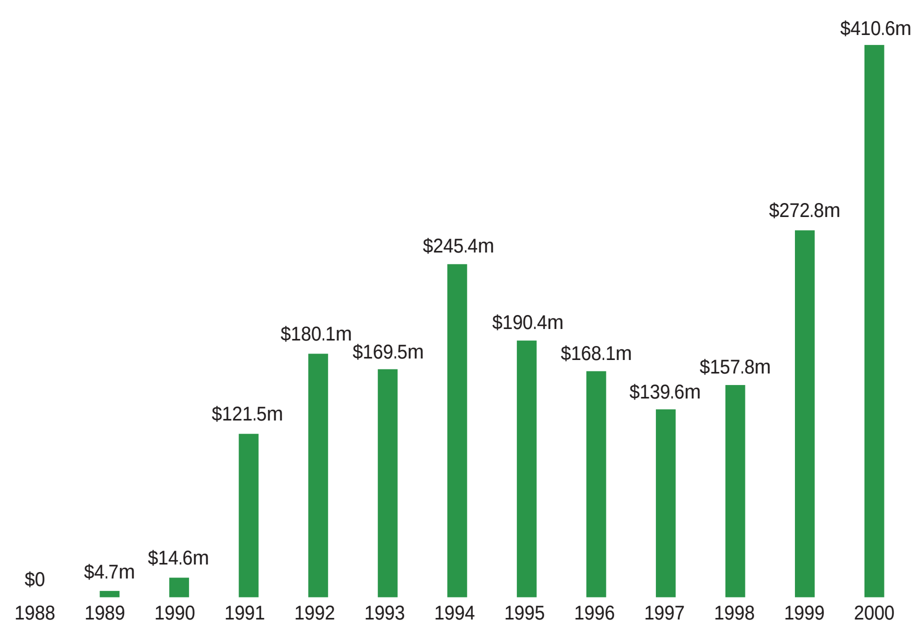
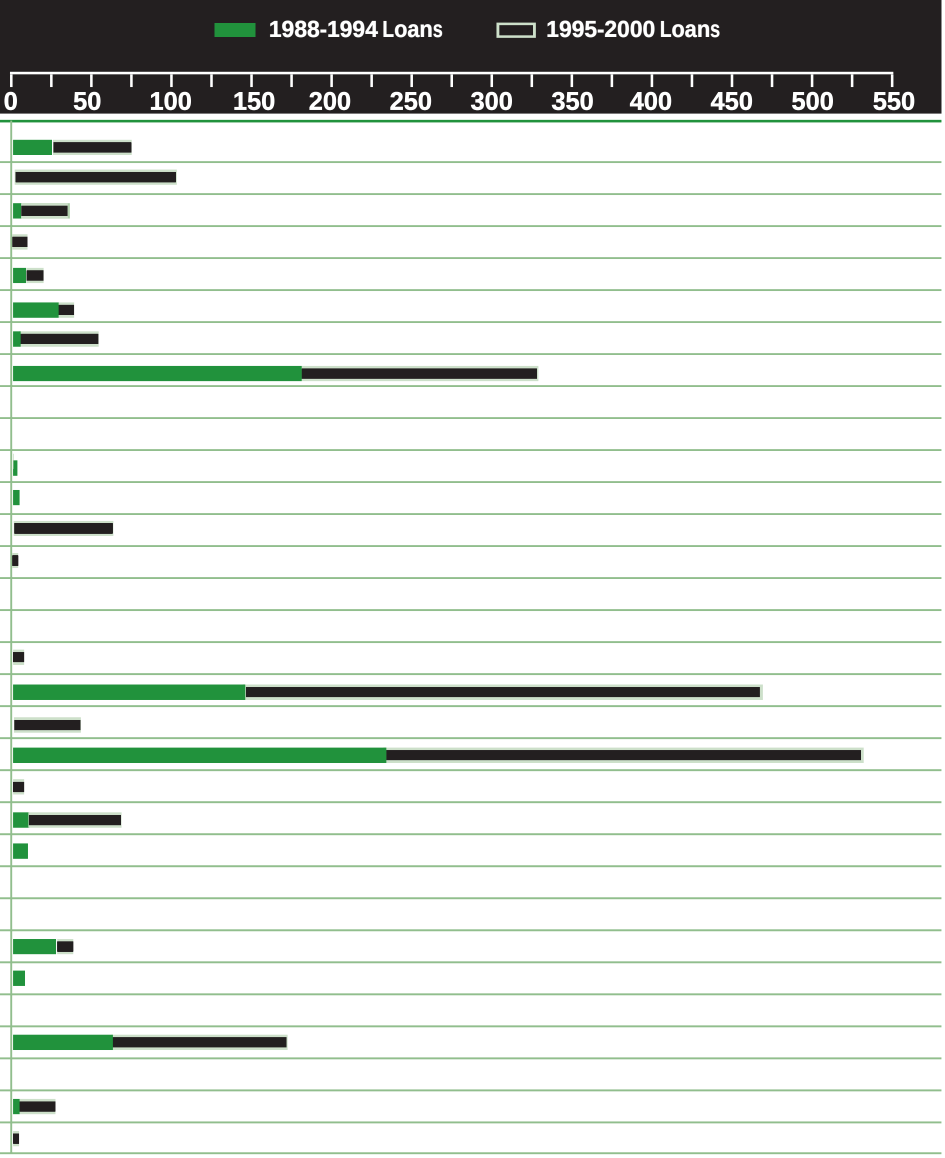


Figure 5.10

Distribution of SRF Loans for CSO Projects by State, 1988—2000

Communities in most states have used SRF loans for CSO projects.

Region/State		1988–1994 CSO Loans (Millions)	1995–2000 CSO Loans (Millions)	Total
1	CT	$23.5	$51.6	$75.1
	MA	$0	$100.9	$100.9
	ME	$4.0	$29.4	$33.4
	NH	$1.1	$8.9	$10.0
	RI	$6.5	$11.2	$17.7
	VT	$27.7	$8.9	$36.6
2	NJ	$2.6	$48.5	$51.1
	NY	$178.7	$147.5	$326.2
3	DC	NA	NA	NA
	DE	$0	$0	$0
	MD	$1.2	$1.2	$2.4
	PA	$2.6	$0	$2.6
	VA	$0	$62.3	$62.3
	WV	$0	$2.8	$2.8
4	GA	$0	$0	$0
	KY	$0.7	$0	$0.7
	TN	$0	$5.0	$5.0
5	IL	$143.8	$322.3	$466.1
	IN	$0	$41.3	$41.3
	MI	$231.6	$297.4	$529.0
	MN	$0	$3.9	$3.9
	OH	$9.4	$57.0	$66.4
	WI	$8.2	$0	$8.2
7	IA	$0	$0	$0
	KS	$0	$0	$0
	MO	$25.5	$10.1	$35.6
	NE	$5.2	$0	$5.2
8	SD	$0	$0	$0
9	CA	$60.8	$107.0	$167.8
10	AK	$0	$0	$0
	OR	$2.5	$21.0	$23.5
	WA	$0	$1.3	$1.3

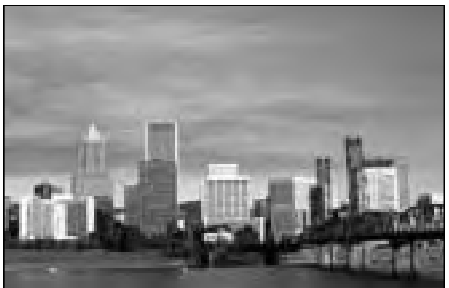


National CSO Loan Award Summary (In Millions)

1988-1994: $735.6
1995-2000: $1,339.5
Total: $2,075.1

projects are eligible to receive a maximum 20-percent grant.

While nearly two-thirds of CSO states have a grant or loan program, most of these are targeted toward small and/or financially distressed communities, and often have fairly low funding levels. Such programs may help initiate the CSO planning process, but few of these programs would help supplement financing large capital expenditures associated with CSO controls.



As part of Portland, Oregon's sampling and monitoring program, the city regularly monitors the Columbia Slough at nine locations for parameters of concern. These include: bacteria, toxics, and nutrients.

Photo: Photodisc

5.8 Performance Measures

Performance measures are objective, quantifiable indicators to track trends and results over time. In the case of CSOs and CSO impacts, the *Combined Sewer Overflow Guidance for Permit Writers* suggests that performance measures generally fall into one of four categories:

- Administrative measures that track programmatic activities such as the number of permits requiring the NMC and LTCPs.
- End-of-pipe measures that show trends in CSO activity, such as reductions in pollutant loading and the frequency and duration of CSO events.
- Receiving water measures that show trends in in-stream concentrations of CSO pollutants, such as dissolved oxygen and total suspended solids.
- Ecological, human health, and designated use measures that show trends in conditions relating to the use of the water, such as beach closures and restored habitat.

All NPDES authorities have a mechanism for tracking administrative performance measures. This information, as collected from the NPDES authorities, was summarized and presented in Section 5.2 of this report.

As part of the data gathering effort for this report, EPA collected data readily available from NPDES authorities that could be used to assess and document other performance measures attributable to CSO control. More than one-quarter of CSO permit files (266 of 859) contained data on end-of-pipe measures, such as frequency or volume of CSOs, typically as part of a permit application or as part of the system characterization activities. Information presented in this format, however, is most often a "snapshot" of current conditions, based on data collected six to 18 months prior to the submission of the report or application. It is not possible to establish meaningful trends in CSO control with this data.

Several NPDES authorities include requirements in CSO permits for submission of end-of-pipe data on a monthly or annual basis, but often have no system for tracking the measures from year to year. For example:

- Some NPDES authorities include requirements in CSO permits to estimate the volume and frequency of overflows, by outfall, as part of a monthly discharge monitoring report (DMR). DMRs are submitted to the NPDES authority as hard copies, and the NPDES authority has no electronic system for tracking data reported by CSO communities.

- Some NPDES authorities include requirements in CSO permits for annual reports documenting the continued implementation of the NMC. These reports contain information on end-of-pipe measures such as the number of dry weather overflow events during the previous year. NPDES authorities requiring these reports have not established a system for compiling the data reported.

Both cases illustrate situations in which information that could be used to assess benefits from program implementation is filed with the NPDES authority but is not easily accessed and is therefore of limited use.

EPA's review of CSO permit files found that less than 10 percent contained information on specific programs geared toward tracking CSO-related benefits by using receiving water, ecological, human health, or designated use measures of success in CSO planning activities. The activities included measuring in-stream water quality to establish background and pre-control conditions, and monitoring in-stream pollutant characteristics during wet weather events. Documentation of monitoring studies was most often presented in an LTCP, annual reports, periodic reports, or correspondence files between communities and NPDES authorities. No state has developed a system for statewide, CSO-specific assessment.

Data associated with receiving water or ecological performance measures are site-specific. This makes it difficult to track performance measures at the state level. The CSO community case studies developed to support this report indicate that information available from CSO communities may support an assessment using these performance measures. Additional discussion of these measures is provided in Section 6.6 and included in the case studies provided in Appendix C.

5.9 Findings

CSO Permits and Permitting Authorities

- There are 859 CSO permits regulating 9,471 outfalls.
- CSO permits regulate outfalls in 32 states (including the District of Columbia) within nine EPA regions.
- State agencies administer the permitting programs in 28 states; EPA is the NPDES permitting authority for Alaska, the District of Columbia, Massachusetts, and New Hampshire.

CSO Program Development and Permit Requirements

- All of the 32 states with combined sewer systems developed CSO strategies in response to the 1989 National CSO Control Strategy and most have mechanisms in place to address CSOs through

NPDES permits or CWA enforceable mechanisms.

- Upon issuance of the 1994 CSO Control Policy, many state strategies were updated; however, state programs vary in the extent to which they specifically follow the provisions of the CSO Control Policy:
  - 27 require the NMC or a suite of BMPs that include or are analogous to the NMC.
  - 25 have a framework for CSO facilities planning that is consistent with the LTCP approach outlined in the CSO Control Policy.
- 807 (94 percent) of CSO communities are under an enforceable requirement, either in a permit or an enforceable order, to implement some level of CSO control.
- 740 (86 percent) are required to implement a set of BMPs that includes or is analogous to the NMC.
- 559 (66 percent) require development of an LTCP.

Coordination of LTCP Development with Water Quality Standards Reviews

- Most NPDES authorities have not established a process for coordinating the review of LTCPs and the development of CSO permits with the water quality standards authority to determine if revisions to the water quality standards are appropriate.
- Three states (Massachusetts, Maine, and Indiana) have developed statutory frameworks to address water quality standards in CSO-impacted receiving waters.

Enforcement and Compliance Assistance

- Enforcement actions initiated by NPDES authorities are mainly administrative orders used to establish or enforce implementation milestones and deadlines for CSO controls. There have been at least 173 actions to date.
- States have provided compliance assistance to CSO permittees by utilizing EPA-issued guidance documents, developing state guidance and training materials, hosting workshops and conducting outreach. Most states attempt to incorporate CSO compliance activities within the overall NPDES compliance programs for the state.
- States perform compliance monitoring of CSOs through NPDES inspections programs.
- States coordinate enforcement and compliance activities with the region.

Funding

- The SRF loan program is the principal mechanism used by the states to provide funding for CSO control projects ($2.08 billion between 1989 and 2000).
- SRF loans for CSO projects in 2000 were the highest ever, accounting

for $411 million (12 percent of total SRF assistance).

- State-specific loan and grant programs exist but offer limited funding (generally available for use in covering planning and program development versus implementation costs).

Performance Measures

- Data necessary for measuring administrative performance of NPDES authority efforts to implement the Policy are readily available and tracked.

- Data needed for understanding and reporting environmental benefits on a statewide basis are not readily available.

- Comprehensive state data management and analysis on environmental progress (including load reductions associated with CSO control) is not being conducted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOV 18 1996

MEMORANDUM

SUBJECT: January 1, 1997, Deadline for Nine Minimum Controls in Combined Sewer Overflow Control Policy

FROM: Robert Perciasepe
Assistant Administrator
Office of Water

Bob Perciasepe

Steven A. Herman
Assistant Administrator
Office of Enforcement and Compliance Assurance

TO: Water Management Division Directors, Regions I-X
Regional Counsels, Regions I-X
State Directors

The purpose of this memorandum is to call your attention to the January 1, 1997, deadline for implementation of the nine minimum controls by National Pollutant Discharge Elimination System (NPDES) permittees that have combined sewer systems. Implementation of the nine minimum controls is the first key milestone identified in the Combined Sewer Overflow Control Policy (CSO Policy) and is a top Agency priority. We emphasize the importance of meeting this deadline, and we urge you to take the steps necessary to achieve it.

On April 19, 1994, EPA published its Combined Sewer Overflow (CSO) Control Policy in the Federal Register (59 FR 18688). The CSO Policy was developed during a negotiated policy dialogue which included representatives from States, environmental groups, and municipal organizations. CSOs consist of mixtures of sanitary sewage, industrial wastewater and storm water runoff. During storm events, a major portion of the combined flow may be discharged untreated into the receiving water. As noted in the CSO Policy (59 FR at 18689):

> CSOs can cause exceedances of water quality standards (WQS). Such exceedances may pose risks to human health, threaten aquatic life and its habitat, and impair the use and enjoyment of the Nation's waterways.

The CSO Policy describes a phased process for achieving control of CSOs and compliance with the technology-based and water quality-based requirements of the Clean Water Act. The first phase involves prompt implementation of best available technology economically achievable (BAT)/best conventional pollutant control technology (BCT). At a minimum, BAT/BCT includes the nine minimum controls, as determined on a best professional judgment (BPJ) basis by the permitting authority. The first phase also includes development of a long-term CSO control plan that will provide for attainment of water quality standards (WQS).

The nine minimum controls are measures that can reduce CSOs and their effects on receiving water quality and that should not require significant engineering studies or major construction. They are as follows:

* Proper operation and maintenance;
* Maximum use of the collection system for storage;
* Review and modification of pretreatment requirements;
* Maximization of flow to the publicly owned treatment works (POTW) for treatment;
* Prohibition of CSOs during dry weather;
* Control of solid and floatable materials in CSOs;
* Pollution prevention;
* Public notification of CSO occurences and impacts;
* Monitoring of CSO impacts and the efficacy of CSO controls. See 59 FR at 18691.

The nine minimum controls are to be implemented, with appropriate documentation, "as soon as practicable but no later than January 1, 1997." 59 FR at 18691.

EPA's guidance Combined Sewer Overflows: Guidance for Nine Minimum Controls (EPA-832-B-95-003, May 1995) discusses how to implement the nine minimum controls and to document their implementation. This document may be obtained through EPA's Water Resource Center (Tel. 202-260-7786) (E-mail waterpubs@epamail.epa.gov) or through the National Small Flows Clearinghouse (Tel. 1-800-624-8301).

As already noted, implementation of the nine minimum controls is a top Agency priority, and we believe it is an essential component of a municipality's CSO control program. We intend to track the status of implementation closely during FY 1997 through a CSO program performance plan developed under the Government Performance and Results Act. Under the performance plan, EPA Regional and State permitting authorities will be expected to compile and report data to EPA Headquarters during the second quarter of FY 1997, and periodically thereafter, regarding various aspects of CSO program implementation, including implementation of the nine minimum controls by their CSO communities.

The CSO Policy contemplates that implementation of the nine minimum controls should become an enforceable obligation through inclusion in "an appropriate enforceable mechanism." 59 FR at 18691. For those permits subject to renewal before January 1, 1997, the new permits should include a provision requiring implementation of the nine minimum controls by January 1, 1997. For permits not subject to renewal before January 1, 1997, the permitting authority should reopen the current permit to add a provision requiring implementation of the nine minimum controls by January 1, 1997, if cause exists pursuant to 40 CFR 122.62(a) or (b) or analogous State regulations. An administrative order to require implementation of the nine minimum controls would normally be appropriate in instances where the CSO permittee is in violation of a permit condition, including violation of a permit limit incorporating narrative standards (such as no discharge of floatables, or no discharge of toxics in toxic amounts) or where there is a violation of a permit condition prohibiting exceedance of a numeric State water quality standard.

EPA has encouraged permittees to move forward to implement the nine minimum controls prior to inclusion of such a requirement in a permit or other enforceable mechanism, and we recognize that many communities have made significant progress in implementing the nine minimum controls and in developing or implementing long-term control plans. Permittees should be reminded that EPA's approach, as stated in the CSO Policy, not to seek civil penalties for past CSO violations will not apply unless the nine minimum controls are implemented by January 1, 1997. See 59 FR at 18697.

EPA Regions and States are encouraged to continue compliance assistance efforts to ensure implementation of the nine minimum controls by January 1, 1997.

If you have questions concerning this memorandum, please contact either John Lyon of the Office of Regulatory Enforcement (Tel. 202-564-4051) or Ross Brennan of the Office of Wastewater Management (Tel. 202-260-6928).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JAN 14 1999

MEMORANDUM

SUBJECT: Water quality-based and technology-based CSO requirements

FROM: Michael B. Cook, Director
Office of Wastewater Management

Eric Schaeffer, Director
Office of Regulatory Enforcement

TO: Water Division Directors, Regions 1-10
Regional Counsels, Regions 1-10
Enforcement Division Directors, Regions 1, 2, 6, 8

Since EPA released the Combined Sewer Overflow (CSO) Control Policy in 1994 (59 FR 18688), questions have arisen concerning the relationship between the water quality-based and technology-based requirements of the Clean Water Act to CSOs, particularly where enforcement cases are pending or imminent. This memorandum clarifies that:

1. Because CSOs are subject to the technology-based requirements of the Clean Water Act (CWA), permitting authorities must specifically determine best available technology economically achievable (BAT)/best conventional pollutant control technology (BCT) on a case-by-case basis using best professional judgment (BPJ) during the permitting process. Given the protectiveness of properly-applied water quality standards (WQS), we expect the combination of the nine minimum controls (NMC) and water quality-based controls described in the CSO Policy to be generally at least as stringent as any applicable BAT/BCT requirements. Therefore, evaluation of CSO controls beyond the NMC may appropriately focus primarily on water quality issues.

2. Enforcement, permitting, and water quality programs should coordinate closely to reach agreement on the requirements of a long-term CSO control plan (LTCP). Where there is a pending enforcement case, the enforcement remedy should be consistent with WQS and with both water quality-based and technology-based permit requirements resulting from the CSO planning process.

Our expectation is that NPDES permitting, enforcement, and WQS staff would work on a cooperative basis with the permittee, following the course described below. This process assumes the collaborative participation of the CSO discharger in the approach to CSO planning described in EPA's policy and guidances. In enforcement cases, court-ordered litigation schedules or serious lack of good faith in negotiations by a defendant may influence the process for planning and selecting a CSO remedy.

Water quality-based requirements

The CSO Policy encourages a watershed-based approach to CSO planning. The LTCP should include extensive analysis of current water quality conditions, including the impacts of CSOs and other pollution sources on WQS attainment. It should evaluate the cost, performance, and likely water quality improvements associated with a wide range of CSO control alternatives and evaluate control measures based on cost/performance criteria (as described in EPA guidance) as well as CWA requirements.

Data developed during LTCP development can inform decisions about the attainability of designated uses and the appropriateness of any WQS revisions. Data contained in the LTCP can in many cases be used as the basis of a use attainability analysis. State and Federal WQS authorities need to be involved throughout the planning process to ensure that, if the LTCP is based in part on anticipated changes to WQS, those changes are appropriate and satisfy Federal regulatory requirements.

State and Federal NPDES authorities must coordinate throughout the planning process to ensure that the controls in the proposed LTCP will ensure that CSOs do not cause or contribute to any exceedance of WQS, including any applicable revisions to WQS. Stakeholders, especially groups representing environmental interests, should be encouraged to participate actively during the development of the LTCP, including the consideration of potential WQS revisions.

Technology-based requirements

The CSO Policy calls for all CSO communities to implement the NMC. For each CSO community, the NPDES authority must determine on a best professional judgment (BPJ) basis whether the NMC satisfy the technology-based requirements of the CWA, considering the factors identified at 40 CFR 125.3.[1] The LTCP must include sufficient information concerning these factors to support a BPJ determination by the permitting authority. A BPJ analysis of any potential technology-based controls beyond the NMC would typically be conducted on a system-wide basis, rather than outfall-by-outfall.

We expect that, given the protectiveness of properly-applied WQS, the NMC, combined with water quality-based controls, will generally provide a level of CSO control that meets CWA requirements and is at least as stringent as technology-based controls identified on a BPJ basis. Although the permitting authority must still perform an analysis of technology-based requirements, the evaluation of potential CSO controls beyond the NMC may appropriately focus primarily on water quality issues, as described in EPA guidance.[2]

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1. EPA, 1995. *Combined Sewer Overflows — Guidance for Permit Writers* (EPA 832-B-95-008), p. 3-8.

2. EPA, 1995. *Combined Sewer Overflows — Guidance for Long-Term Control Plan* (EPA 832-B-95-002).

Coordination of enforcement, permitting, and water quality programs in enforcement cases

When an enforcement action is pending, enforcement, permitting, and WQS staff (both State and Federal) should coordinate closely throughout the CSO planning process, with the goal of reaching consensus on a LTCP that will meet all expected water quality-based and technology-based permit requirements and is consistent with the CSO Policy.

During the planning process, enforcement staff should clearly articulate its views concerning the appropriateness of any proposed WQS revisions, proposed water quality-based and technology-based permit requirements, and the adequacy of CSO control alternatives. Issues of concern between enforcement, permitting, and WQS staff should be elevated early in the planning process to ensure agreement on the LTCP when it is completed.

Assuming that there is agreement that the LTCP will meet the expected requirements of a Phase 2 permit, the enforcement program would then negotiate a schedule in an enforceable mechanism for implementation of the LTCP. If a LTCP assumes future revisions to WQS, the implementation schedule may account for such revisions if there is reasonable confidence that these revisions will become effective in the near future (i.e., that the WQS authority will in fact proceed with such revisions expeditiously, and that EPA will approve them). In such a case the schedule should include a reopener provision in the event that the anticipated revisions do not in fact occur. Such a reopener should require the implementation of specific controls, rather than a return to the planning phase.

If EPA concludes that it will disapprove the anticipated revisions to WQS and promulgate Federal WQS, then the enforcement remedy should provide for attainment of the expected Federal WQS. Similarly, if EPA concludes that it will object to an anticipated State-issued permit and issue a Federal permit if necessary, the enforcement remedy should be consistent with the expected conditions of the Federal permit.

If there is disagreement among EPA programs as to whether anticipated revisions to WQS should be disapproved, or as to whether EPA should object to an anticipated Phase 2 permit, the relevant programs should attempt to resolve the issue, and elevate it if necessary. The enforcement program should seek a remedy consistent with the resolution of the WQS and permitting issues, in order to ensure that the enforcement remedy is consistent with the expected WQS and permit requirements.

If you have questions concerning this memorandum, please contact one of us, or have your staff call John Lyon of the Office of Regulatory Enforcement at (202) 564-4051 or Ross Brennan of the Office of Wastewater Management at (202) 260-6928.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAY 19 1998

MEMORANDUM

SUBJECT: Implementation of the CSO Control Policy

FROM: Robert Perciasepe
Assistant Administrator
Office of Water

Bob Perciasepe

Steven A. Herman
Assistant Administrator
Office of Enforcement and Compliance Assurance

TO: Water Management Division Directors, Regions 1-10
Regional Counsels, Regions 1-10
State Directors

The purpose of this memorandum is to discuss implementation of the Combined Sewer Overflow Control Policy (CSO Policy) and identify areas where heightened efforts are necessary.

The Environmental Protection Agency (EPA) published the CSO Policy on April 19, 1994 (59 FR 18688), following a negotiated policy dialogue among representatives from States, environmental groups, municipal organizations, and EPA. The CSO Policy provides for a phased process to bring communities with combined sewer systems into compliance with the technology-based and water quality-based requirements of the Clean Water Act. To date, EPA has released six guidance documents and continues to work with stakeholders to foster implementation of the Policy.

The CSO Policy is now four years old and continues to be recognized as an example of innovation and good government. In principle, EPA and its stakeholders continue to affirm the Policy's key themes, such as permitting flexibility, stakeholder coordination and public participation, financial capability as a factor affecting implementation schedules, and examination of water quality standards as appropriate. In practice, however, many challenges remain, and implementation of the Policy has not met some initial expectations.

Nine Minimum Controls. The CSO Policy's first key milestone was implementation of the nine minimum controls by January 1, 1997. The nine minimum controls are measures that can reduce CSOs and their effects on receiving water quality without requiring significant engineering studies, construction activity, or financial investment. In a November 18, 1996, memorandum to the Regional and State Directors, we communicated the importance of meeting this deadline.

Under the CSO Policy, implementation of the nine minimum controls should become an enforceable obligation through inclusion in an appropriate enforceable mechanism. The Policy describes how the nine minimum controls and other CSO requirements are to be included in National Pollutant Discharge Elimination System (NPDES) permits (renewed permits or reopened and reissued permits) or administrative orders. The November 18, 1996, memorandum reminded NPDES authorities that the approach identified in the CSO Policy — not to seek civil penalties for past CSO violations — would not apply unless the permittee has no discharges during dry weather and meets the objectives and schedules of the CSO Policy, including the January 1, 1997, deadline for implementing the nine minimum controls. By now, every CSO community should be implementing the nine minimum controls, and most NPDES permits should contain measurable, enforceable, and specific conditions requiring implementation of the nine minimum controls, including submittal of appropriate documentation.

Although the January 1, 1997, implementation deadline has passed, our best information from EPA Regions and States indicates that only about 52 percent of CSO communities are currently implementing the nine minimum controls. Approximately another 25 percent have not yet implemented the nine minimum controls but are under an enforceable requirement to do so in the future.

There are several reasons for this. Many communities' permits have not yet been reissued to include the nine minimum controls, and permittees are reluctant to implement the nine minimum controls in the absence of an enforceable requirement. Some States have focused their efforts on requiring long-term control plans or have resisted using enforcement mechanisms as implementation tools. We believe, however, that the nine minimum controls are an essential element of any community's CSO program and that full implementation of the nine minimum controls is crucial to the success of the CSO Policy. The goal of 100 percent implementation remains a high Agency priority. We will continue to track implementation of the nine minimum controls and coordinate with EPA and State enforcement authorities as necessary to foster compliance.

We also stress the need for communities to provide appropriate documentation that they have implemented the nine minimum controls and for NPDES authorities to review this information thoughtfully. To date, although 52 percent of CSO communities have implemented the nine minimum controls, approximately 42 percent have submitted documentation. The Agency does not believe documentation is simply a "paperwork" exercise. Rather, documentation describes the community's comprehensive effort to use the nine minimum controls to reduce the frequency, volume, and impacts of CSOs. Without strong documentation, a CSO community and its permitting authority cannot meaningfully assess the effectiveness of the nine minimum controls and the extent to which additional controls, if any, may be needed.

Long-Term Control Plans. The CSO Policy calls for initial ("Phase I") NPDES permits to require development of a long-term CSO control plan as soon as practicable, but generally within two years after issuance of the permit, Section 308 information request, or enforcement action requiring a plan. The long-term control plan should include measures that provide for compliance with the technology-based and water quality-based requirements of the Clean Water Act, including attainment of water quality standards under either the "presumption approach" or the "demonstration approach." The subsequent ("Phase II") permit should require immediate implementation of the control measures in the long-term control plan. The long-term control plan should include a fixed-date implementation schedule. Requirements for expeditious implementation of the long-term control plan should be placed in an appropriate enforceable mechanism.

Regions and States indicate that approximately 33 percent of CSO communities are moving ahead to implement long-term CSO controls. Approximately another 28 percent are subject to an enforceable requirement to develop a long-term CSO control plan. We do not have adequate information to determine how much of the current CSO planning and control activity is being undertaken consistent with the CSO Policy.

Long-term planning consistent with the CSO Policy is key to the success of local CSO control efforts. We urge Regional and State authorities to work actively with permittees to ensure that long-term control plans address important elements of the CSO Policy such as characterization, monitoring, and modeling of the combined sewer system and receiving water; public participation; evaluation of the cost and performance of alternatives; and coordination with State water quality standards authorities and NPDES authorities. EPA Headquarters will continue to track progress in the development of long-term control plans consistent with the CSO Policy.

Water Quality Standards (WQS). Long-term CSO control plans must ensure that both the technology-based and water quality-based requirements of the CWA are met. With respect to water quality-based requirements, the CSO Policy provides that "[d]evelopment of the long-term plan should be coordinated with the review and appropriate revision of WQS and implementation procedures on CSO-impacted receiving waters to ensure that the long-term controls will be sufficient to meet water quality standards" (59 FR 18694). The CSO Policy places a high priority on eliminating or redirecting CSOs that discharge to sensitive areas such as beach areas and shellfish beds. Remaining overflows must neither cause nor contribute to a violation of WQS.

In locations where uses have been designated without consideration for the wet weather conditions of urban streams, it is appropriate to evaluate the attainability of WQS. The CSO Policy recognizes the States' flexibility to review their WQS and encourages them to define recreational and aquatic life uses more explicitly where appropriate. Such refinements could define, for example, seasonal conditions or a particular size storm event when primary contact recreation would not occur. In making such adjustments to uses, however, States must ensure that downstream uses are protected and that the use is fully protected during other seasons or after the storm event has passed. Furthermore, a use attainability analysis would be required in such cases, since use attainability analyses are required prior to the removal of a designated use or the modification of a use to one requiring less stringent criteria. Such a structured scientific analysis is an appropriate mechanism for determining the attainability of a use. In any case, if a State has a reasonable basis to determine that the current designated use could be attained after implementation of the technology-based controls of the CWA, then the use could not be removed.

We strongly encourage Regions and States to work with permittees to ensure that long-term plans are developed consistent with WQS. We also encourage greater coordination among EPA, States, and permittees in refining designated uses as appropriate in CSO-impacted receiving waters. In many cases the permittee's development of a long-term control plan, and the State's review and revision of WQS, will occur concurrently and interdependently. Site-specific data collected as part of the development of the long-term control plan and data from watershed analyses should assist States in evaluating the adequacy of the long-term control plan to contribute to the attainment of WQS. Such data will also provide important information necessary for determining whether a use is attainable and, where the designated use is not attainable, the appropriateness of a variance or other revision to the applicable WQS. Variances may be appropriate, in limited circumstances on CSO-impacted waters, where the State is uncertain as to whether the WQS can be attained and time is needed for the State to conduct additional analyses on the attainability of the WQS.

Measuring Program Performance. The CSO Policy continues to have a high level of support within EPA and among stakeholder groups. With visibility, of course, comes scrutiny. Understandably, the Policy continues to provoke questions about how well a flexible approach can address a costly and complex environmental issue. In addition, implementation of the CSO Policy is occurring amid public demands that investments in pollution control yield tangible environmental benefits.

Under the Government Performance and Results Act (GPRA), EPA developed a pilot performance plan to track the implementation status of the CSO Policy. Program indicators developed under the performance plan include progress in implementation of the nine minimum controls, development of long-term plans, and reduction in the frequency, volume, and adverse water quality impacts of CSOs. The data base developed to implement the performance plan will continue to provide useful insights into the status of CSO Policy implementation and will be a useful program management tool.

Accountability for the CSO Program is also embodied in the Agency's Strategic Plan under GPRA for the water program. Objectives to be attained by 2005 currently include a 30 percent reduction from 1992 levels in annual point source loadings from CSOs, publicly owned treatment works, and industrial sources. EPA's FY 1998 goal is for 80 percent of CSO communities' permits to be issued consistent with the CSO Policy; for FY 1999, the goal is 100 percent consistency.

We also encourage you to support efforts by CSO communities to develop other, locally defined, indicators of progress in controlling CSOs. Locally defined measures of success can provide meaningful incentives to select and implement CSO controls that not only meet CWA requirements but are cost-effective, tailored to local water quality objectives, and likely to yield results that the public, and specifically rate-payers, will support.

In closing, we urge you to help make the CSO Policy a success. We remind you that implementation of the CSO Policy continues to be a high priority for the Water Program and is among the top program priorities for the Office of Regulatory Enforcement in FY 1998. It is essential that all CSO communities be moving aggressively toward two important goals: full implementation of the nine minimum controls and coordination with NPDES and WQS authorities in the development and implementation of long-term control plans. We welcome continued dialogue among EPA Headquarters, Regional, and State permitting and enforcement authorities on removing any identified impediments to achieving these goals.

If you have questions concerning this memorandum, please contact either Ross Brennan of the Office of Wastewater Management at (202) 260-6928, or John Lyon of the Office of Regulatory Enforcement at (202) 564-4051.

Chapter 6

CSO Control Policy Implementation Status: Communities

The CSO Control Policy established implementation objectives and responsibilities for CSO communities in stating:

> *[Communities] with combined sewer systems that have CSOs should immediately undertake a process to accurately characterize their sewer systems, to demonstrate implementation of the nine minimum controls, and to develop a long-term CSO control plan.*

EPA's *Guidance for Long-Term Control Plan* (EPA, 1995f) further outlines the expectations of the permittees:

- Evaluate and implement NMC.
- Submit documentation on NMC implementation by January 1, 1997.
- Develop an LTCP and submit for review to the NPDES permitting authority.
- Support the review of water quality standards in CSO-impacted receiving water bodies.
- Comply with permit conditions based on narrative water quality standards.
- Implement selected CSO controls from the LTCP.
- Perform post-construction compliance monitoring.
- Reassess overflows to sensitive areas.
- Coordinate all activities with NPDES permitting authority, state water quality standards authority, and state watershed personnel.

This chapter describes activities by CSO communities to meet these responsibilities. Specifically, the chapter provides a discussion of the following:

- National CSO demographics
- Implementation of documented CSO controls
- Implementation of the NMC
- Implementation of the LTCP

In this chapter:

Learn More About Them . . .

Additional information about a number of the community CSO programs described in this chapter can be found in Appendix C. Case study communities have this symbol ◆ next to their names.

- Financial considerations
- Obstacles and challenges
- Performance measures and environmental benefits

6.1 National CSO Demographics

Combined sewer systems vary greatly with respect to size, design and performance. Much of this diversity is attributable to site-specific conditions and the evolution of systems over time to accommodate community growth and development. This diversity was a key consideration in the development and issuance of the CSO Control Policy and the emphasis placed on the need for site-specific CSO controls. The introduction to the CSO Control Policy states:

> *The CSO Policy represents a comprehensive national strategy to ensure that municipalities, permitting authorities, water quality standards authorities and the public engage in a comprehensive and coordinated planning effort to achieve cost effective CSO controls that ultimate meet appropriate health and environmental objectives. The Policy recognizes the site-specific nature of CSOs and their impacts and provides the necessary flexibility to tailor controls to local situation.*

While no two CSSs are identical, common attributes that influence the implementation of CSO controls include: the number and location of outfalls, CSS area, treatment plant size, population served, and the characteristics of water bodies receiving CSO discharge. The following sections provide demographic comparisons in these broad areas to better characterize CSO communities nationwide.

6.1.1 CSO Permits and Types of Systems

Nationally, 859 CSO permits have been issued to 772 CSO communities in 32 states. These 859 CSO permits regulate 9,471 CSO discharge points. The geographic distribution of CSO permits and CSO communities is presented in Figure 6.1. CSO permits have been issued to the owners and operators of two types of systems with CSO outfalls:

- Combined sewer systems that include a POTW.
- Combined sewer systems that convey flows a POTW owned and operated by a separate entity under a different permit for treatment.

Communities that maintain and operate combined sewer systems but send wastewater flows to regional or remote treatment works are often termed satellite collection systems (SCSs). As shown in Figure 6.2, the 859 CSO permits include 642 combined systems with POTWs, 185 SCSs, and 32 combined systems that EPA was unable to classify due to insufficient data.

6.1.2 CSO Size

NPDES permittees are commonly classified by NPDES authorities as "major" or "minor" dischargers. Facilities are designated as "major" if the design discharge is greater than 1 mgd. Other facilities (with flows less than 1 mgd) can be classified as major on a case by case basis when NPDES authorities want a specific permit to have a stronger regulatory focus. The major classification is used to guide permitting, compliance, and enforcement activities to ensure larger sources of pollutants are given priority. Major facilities are typically inspected annually and must report monthly effluent concentrations and loadings. NPDES authorities must record monthly operating and performance data in PCS for major facilities. In addition, EPA regions review and approve issuance and reissuance of the permit for major facilities. Minor facilities generally have less stringent requirements.

Based on PCS data for the 642 CSO permits that include POTWs, EPA found that 70 percent of the CSO permits were classified as major facilities (Figure 6.3). For these same 642 CSO permits, EPA was able to obtain secondary treatment design flow data for 615. For these 615 CSO permits, EPA developed a frequency distribution based on design flows for POTWs serving CSSs (Figure 6.4).

As shown, about 50 percent of CSO permits are associated with POTW design capacities less than 2.5 mgd, and 70 percent have design capacities of less than 7.5 mgd.

Figure 6.1

Geographic Distribution of CSO Permits

CSOs are concentrated in the Northeast and Great Lakes regions.

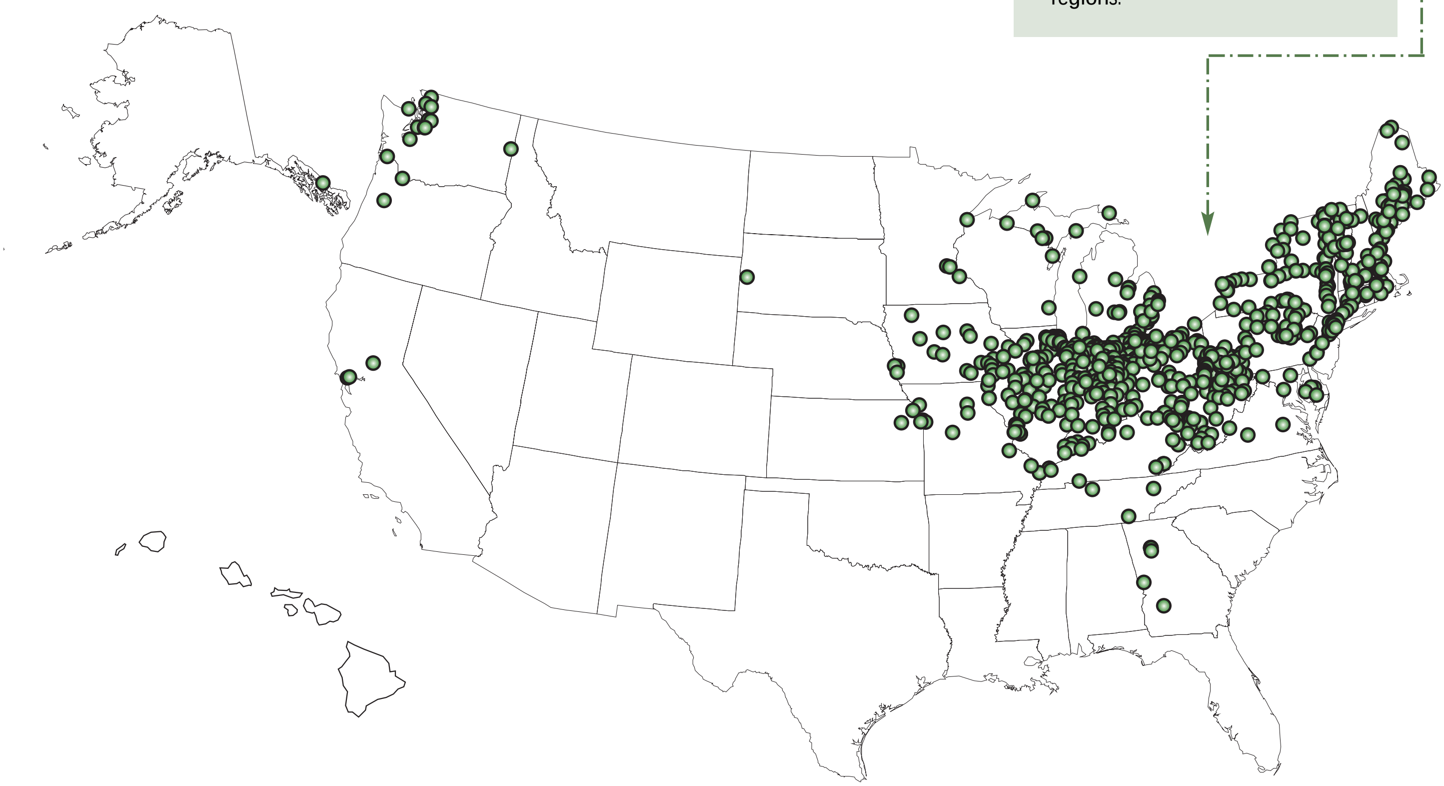


Figure 6.2

Types of CSO Facilities

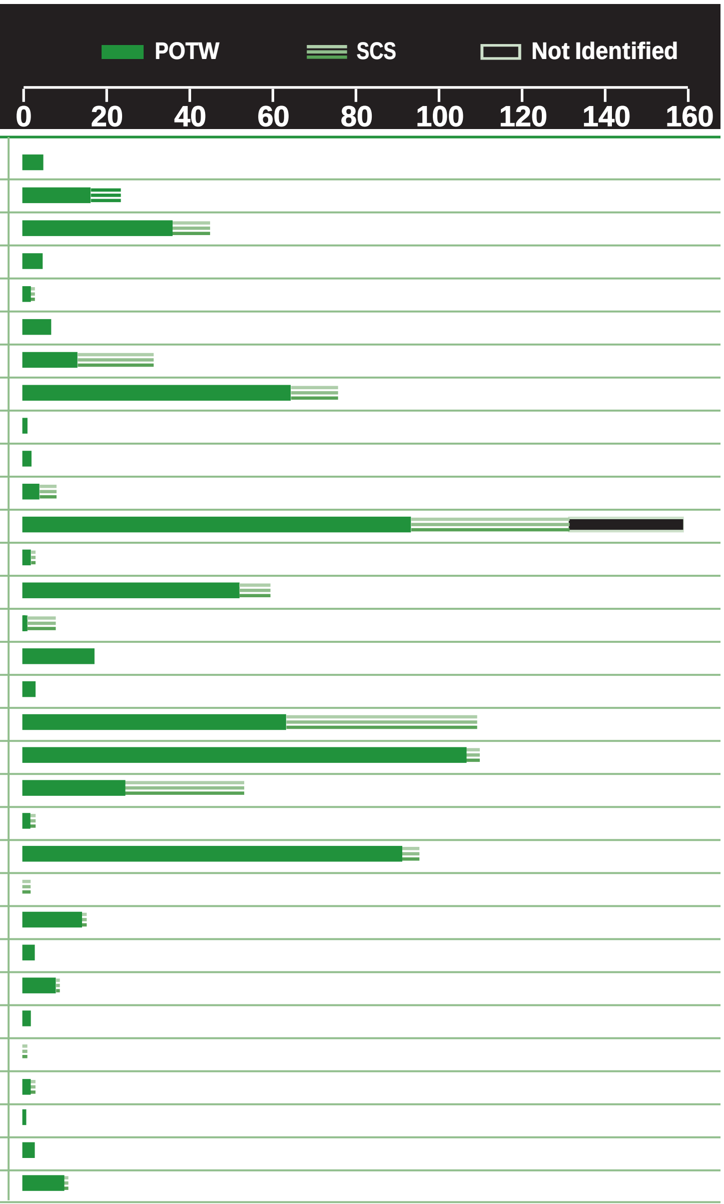
The owner/operators of nearly 80 percent of CSSs have a POTW within their jurisdiction. The remainder send their wastewater to a treatment facility owned/operated by a separate jurisdiction.

6.1.3 Small System Considerations

The CSO Control Policy recognizes that the development of an LTCP may be difficult for some small jurisdictions:

> *At the discretion of the NPDES Authority, jurisdictions with populations under 75,000 may not need to complete each of the formal steps outlined in Section II.C of this Policy, but should be required through their permits or other enforceable mechanisms to comply with the nine minimum controls (II.B), public participation (II.C.2), and sensitive areas (II.C.3) portions of this Policy.*

Region/State		POTW	Satellite Collection System	No Information Available	Total
1	CT	5			5
	MA	16	7		23
	ME	35	9		44
	NH	5			5
	RI	2		1	3
	VT	7			7
2	NJ	13	18		31
	NY	63	11		74
3	DC	1			1
	DE	2			2
	MD	4	4		8
	PA	91	37	27	155
	VA	2	1		3
	WV	51	7		58
4	GA	1	7		8
	KY	17			17
	TN	3			3
5	IL	62	45		107
	IN	104	3		107
	MI	24	28		52
	MN	2		1	3
	OH	89	4		93
	WI			2	2
7	IA	14	1		15
	KS	3			3
	MO	8		1	9
	NE	2			2
8	SD		1		1
9	CA	2	1		3
10	AK	1			1
	OR	3			3
	WA	10	1		11
Total		**642**	**185**	**32**	**859**



Of 859 permits, 642 have POTWs, 185 are SCSs, and 32 were not identified.

Category	#of Permits	Percent
Facility Size Classification		
▽ Major	448	70%
▼ Minor	194	30%
Total Facilities	**559**	**100.0%**

Figure 6.3

POTW Facility Size Classification

The category of "major POTW" includes any facility designed to handle more than 1 mgd. More than two-thirds of CSO facilities are considered major.

EPA does not have population data by permit for CSSs, but the flow classification data presented in Figure 6.4 can be used as a surrogate measure. A common engineering standard is that 10,000 people generate 1 mgd. Using this as a guide, 70 percent of the 615 CSO permits (with available flow data) are for facilities with secondary treatment design flows less than 7.5 mgd, or a population of less than approximately 75,000.

6.1.4 CSO Receiving Waters

EPA's review of NPDES files provided data on the types of water bodies receiving CSO discharges. Names for these receiving water bodies were available in 761 of the 859 CSO permits, with many permits listing multiple receiving waters. The use of names for classifying water bodies complicates environmental analysis, as similar names may refer to very different waters. For example, the term "river" fails to distinguish free flowing waters from tidally influenced rivers, or to differentiate waters with significant differences based on geographic location. Also, names of water bodies may often reflect a historic name as opposed to a classification based on volume, flow, salinity, or other characteristics. At a national scale, however, the data allow a comparison of the distribution of CSOs relative to receiving water types, as presented in Figure 6.5. As shown, CSOs most commonly discharge to rivers and streams.

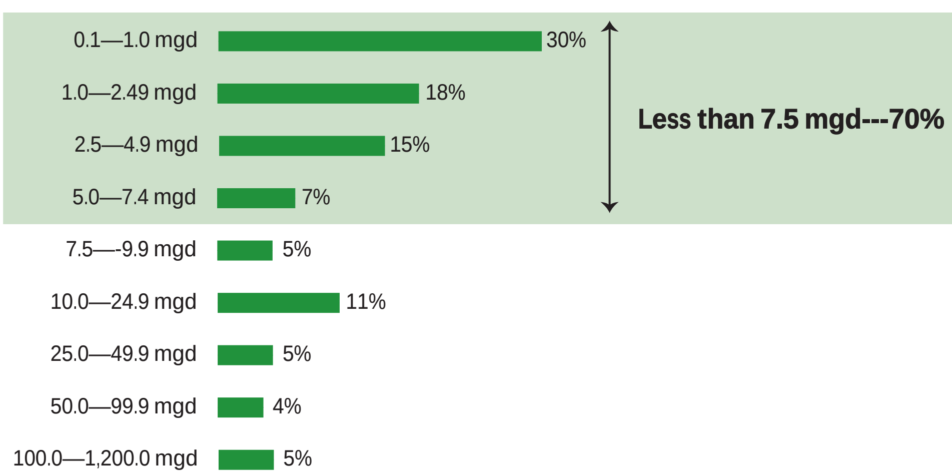


Figure 6.4

Distribution of POTW Facility Sizes

POTWs serving combined systems range in size from 0.1 mgd to 1,200 mgd, but most are designed to process less than 7.5 mgd.

6.2 Implementation of CSO Controls

Many community-level CSO programs predate the CSO Control Policy. The design and operation of CSSs has required municipalities to consider wet weather flows and system capacities in operating, upgrading, and expanding service. As more NPDES authorities initiated formalized CSO programs in the 1980s, greater attention was paid to the implementation of controls and to research, development, and testing of possible control alternatives.

Although this chapter of the report focuses on community implementation of controls in the context of the CSO Control Policy, other instances of documented controls are discussed. Documented controls include those resulting from implementation of the NMC, LTCP control alternatives, or other CSO studies or planning efforts.

Many communities have either separated their CSS or eliminated overflows (through system management or outfall elimination). Prior to this report, national tracking and estimates of communities that had separated or eliminated CSOs were not available. Data gathered for this report has established a baseline of CSO facilities (including those that have recently separated). Complete separation, full outfall elimination, or substantial completion of CSO control efforts was found for 87 CSO permits.

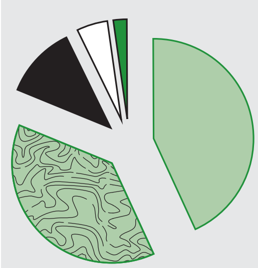
6.2.1 Assessment of Control Implementation

During visits to states and regions, NPDES files for 781 CSO permits were reviewed. Data on implemented controls for another 30 CSO permits were on file with EPA or were provided by the NPDES authority or the region. In discussing implementation, any controls documented for these 811 CSO permits are considered. Documentation types included NMC implementation reports, draft and final LTCPs, annual CSO reports, other engineering and planning documents, enforcement files, and correspondence and communication records maintained in the NPDES files. In the case of annual reports, documented controls were typically for specific reporting periods (i.e., the previous year) rather than a comprehensive set of CSO controls being considered and implemented. EPA believes that more comprehensive

Figure 6.5

Types of Waters Receiving CSO Discharges

Discharges occur to a wide variety of freshwater and marine environments, but most outfalls are located on rivers and streams.



Category	#of Waterbodies	Percent
Types of CSO Receiving Waters		
Rivers	606	43%
Streams	538	38%
Other	164	12%
Oceans/Bays/Estuaries	69	5%
Ponds/Lakes	32	2%
Total CSO Receiving Waters	**1,409**	**100.0%**

data on the implementation of CSO controls resides with CSO communities. Collection of data at the CSO community level will be a focus of the 2003 Report to Congress.

6.2.2 Documented Implementation of CSO Controls

In reviewing all data available for the 811 CSO permits, EPA found:

- 735 (91 percent) documented implementation of some BMP-type or structural control to reduce or eliminate CSOs.

EPA found that a significant number of CSO communities submitted documentation to the NPDES authority for significant structural controls implemented outside the scope of an LTCP. Specifically, 274 (34 percent) of the 811 CSO communities submitted documentation for project-specific CSO controls that do not meet all LTCP requirements, as defined by the CSO Control Policy, but surpass the minimal capital investment expectations of the NMC. These controls cover a range of activities including:

- Developing and implementing wet weather operating plans at POTWs.
- Using existing sewer system evaluation study (SSES) as the basis for a CSO control program.
- Continuing implementation of CSO facility plans that pre-date the CSO Control Policy.

The remaining sections examine CSO control implementation based on the requirements identified in the CSO Control Policy and assess the status of policy implementation at the community level.

6.3 Implementation of the NMC

Implementation of the NMC was expected to be one of the first steps taken by CSO communities in response to the CSO Control Policy. The NMC are controls that can reduce CSOs and their effects on receiving water quality, do not require significant engineering studies or major construction, and can be implemented in a relatively short period (e.g., within a few years). The CSO Control Policy states that the CSO permittee:

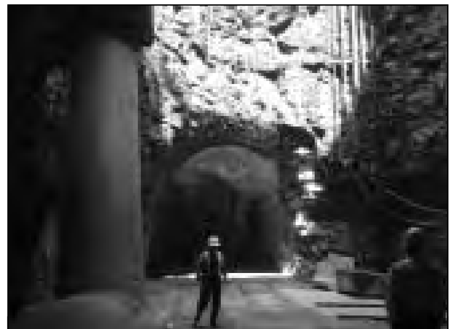
> *... should submit appropriate documentation demonstrating implementation of the nine minimum controls ...*

and

> *... this documentation should be submitted as soon as practicable, but no later than two years after the requirement to submit such documentation is included in an NPDES permit or other enforceable mechanism.*

The CSO Control Policy goes on to specify:

> *... documentation should be completed as soon as practicable but no later than January 1, 1997.*



Richmond, VA has been implementing CSO controls since the early 1980s. The storage tunnel at the Falls of the James River, shown, is part of the second phase of a plan that included increased wet weather storage and treatment capacity.

Photo: City of Richmond Department of Public Utilities

Documentation submitted to the NPDES authority on implementation of the NMC should demonstrate:

- *Alternatives considered for each minimum control*
- *Actions selected and reasons for selection*
- *Selected actions already implemented*
- *A schedule showing additional steps to be taken*
- *Effectiveness of the minimum controls in reducing/eliminating water quality impacts*

The individual NMC are not necessarily distinct and separate from each other. Controls can be paired or implemented in sequence to maximize the anticipated benefit of the controls. Many control activities can address more than one of the NMC at the same time (e.g., street sweeping can address both the "control of solids/floatables" and the "pollution prevention" controls). In the *Combined Sewer Overflows Guidance for Nine Minimum Controls* (EPA, 1995b), EPA indicated that the NMC are intended to be implemented in a holistic manner to achieve the ultimate goal of reducing CSO impacts.

6.3.1. NMC Implementation Status

EPA found documentation verifying implementation of at least one of the NMC in 627 (77 percent) of the 811 CSO permit files reviewed, as well as documentation confirming implementation of all of the NMC in 258 permit files. The number and percentage of CSO permits documenting implementation of each of the NMC is presented in Table 6.1.

Table 6.1 shows that more CSO communities have implemented the first six of the NMC than have implemented the last three. The first six controls were identified in the 1989 National CSO Control Strategy (in which they were referred to as the six minimum measures) and were to be incorporated into state-wide strategies.

The *Guidance for Nine Minimum Controls* states:

> *The NPDES permitting authority may choose to require the municipality to keep some records of NMC implementation on-site rather than requiring all documentation to be submitted.*

Given this option and the data limitations identified in Section 6.2.1, Table 6.1 likely underestimates actual implementation of the NMC.

6.3.2 Specific CSO Control Measures Implemented for the NMC

The CSO Control Policy and EPA's guidance provide considerable flexibility with respect to the type and range of activities or programs that may be undertaken to implement any one of the NMC. EPA found descriptions of specific NMC activities implemented in files associated with 381 of the 627 files with documented implementation. Table 6.2 presents the 10 most common NMC activities undertaken by CSO communities and

NMC Category	Number of Documented Implementations	% of 811 Permits Reviewed
1—Proper O&M	567	70%
2— Maximize use of collection system for storage	571	70%
3—Pretreatment program review and modification	526	65%
4—Maximize flow to the POTW	561	70%
5—Eliminate dry-weather overflows	567	70%
6—Solids and floatables control	478	59%
7—Pollution prevention	455	56%
8—Public notification	450	56%
9—Monitoring of CSO impacts and efficacy of controls	430	53%

Table 6.1

Status of NMC Implementation Documentation

EPA reviewed 811 permit files for documentation of NMC implementation. As the table shows, the first six minimum controls are more widely implemented than the last three.

the number and percentages of CSO permit files documenting use of the activity in information submitted to the NPDES authority. A more detailed list of CSO controls implemented by CSO communities to address the NMC is presented in Appendix R.

The following subsections describe the individual NMC and provide select examples of implementation activities by CSO communities.

NMC 1—Proper operation and regular maintenance programs for the sewer system and the CSOs.

The effectiveness of this control relies on a well-developed operation and maintenance (O&M) program. An O&M program generally should include the following:

- The organizations and people responsible for various aspects of the O&M program.

NMC Activity	NMC Category	Implementation Frequency	% of 381 Permits Reviewed
Street sweeping and cleaning	6	181	48%
Catch basin cleaning	6	158	41%
Public education programs	8	101	27%
Sewer flushing	1	90	24%
Screens and trash racks	6	84	22%
In-sewer storage	2	77	20%
Solid waste reduction and recycling	7	68	18%
Infiltration and inflow control	2	66	17%
Industrial pretreatment	3	61	16%
Area/foundation drain, roof leader disconnection	2	57	15%

Table 6.2

10 Most Frequently Implemented NMC Activities

EPA found 381 permit files with descriptions of specific activities undertaken to implement one or more of the NMC. Solids and floatables control measures dominated the top five activities. Six of the NMC are represented in this list.

Planning and budgeting for operations and maintenance procedures is needed to ensure that expensive capital equipment, such as this vortex separation system in Columbus, GA continues to function properly.

Photo: Columbus Water Works

- The resources (i.e., people and funding) allocated to O&M activities.
- Planning and budgeting procedures for O&M of the CSS and treatment facilities.
- A list of facilities (e.g., tide gates, overflow weirs) critical to the performance of the CSS.
- Written procedures and schedules for routine, periodic maintenance of major items of equipment and CSO diversion facilities, as well as written procedures to ensure that regular maintenance is provided.
- A process for periodic inspections of the facilities listed previously.
- Written procedures, including procurement procedures, if applicable, for responding to emergency situations.
- Policies and procedures for training O&M personnel.
- A process for periodic review and revision of the O&M program.

An example of implementation:

New York City, NY

New York City increased surveillance and maintenance of CSO regulators and pump stations and improved wet weather operations at its wastewater treatment plants. These efforts contributed to a 96-percent reduction of bypassed flow during wet weather events, from 1,845 mg in FY 1989 to 61.4 mg in FY 1998. In addition, as part of its study to reduce floatables discharge to New York Harbor, New York City found ways to adjust normal operation and maintenance activities to prevent floatables from entering the system. An ongoing two-year cycle for cleaning the more than 100,000 catch basins in the city was initiated in 1996 (NYCDEP, 1997).

NMC 2: Maximum use of the collection system for storage

This control depends on the identification of potential storage locations where simple or minor modifications can be made to increase in-system storage. Several activities are used to implement this control:

- Collection system inspection to identify deficiencies, blockages, or accumulation of debris that limit storage.
- Removal of deposits through cleaning and sewer flushing to restore full storage capacity.
- Inspection, maintenance and repair of tide gates to prevent tidal intrusions from entering the combined sewer system during dry and wet weather conditions.
- Adjustment of regulator settings to increase in-system storage.
- Modification of catch basin inlets to retard inflow.
- Elimination of direct connections from roof leaders and basement sump pumps to reduce flow to the combined sewer system.

- Detention of runoff in upstream areas (parking lots, streets, ponds) to increase storage in the combined sewer system.
- Coordination of pumping operations to maximize storage in the combined sewer system.

Examples of implementation:

Wilmington, DE

Leaking tide gates and poorly adjusted regulator settings allow substantial amounts of water to enter sewer collection systems. This unwanted inflow uses in-system storage and adds to treatment costs. The City of Wilmington observed that at high tide, river water was spilling over a regulating weir at one of its largest CSO outfall structures and into the collection system. A simple, inexpensive solution was employed to increase the weir elevation by 16 inches. Pump station records indicated that this modification reduced inflow by 5 mgd and increased in-system storage by an equivalent amount during periods of wet weather flow. A more permanent solution was implemented when the same weir was reconfigured during construction of a floatables control unit (City of Wilmington DPW, 2000).

Skokie, IL

Skokie implemented a city wide program to retard the delivery of surface runoff entering the CSS. Berms were used to increase on-street storage, and flow restrictors were used to reduce the peak rate of flow entering the CSS. Skokie constructed 871 berms on streets and installed more than 2,900 flow-restricting devices at catch basins. In addition, most of the roof drains were disconnected, resulting in a substantial reduction in wet weather flow entering the CSS (EPA,1999c).

NMC 3: Review and modification of pretreatment requirements to assure CSO impacts are minimized

For this control to be effective, municipalities must develop an inventory of non-domestic dischargers, assess potential volume and pollutant impacts, evaluate the feasibility of modifying pretreatment programs, and implement control measures.

Examples of implementation:

✥ **Richmond, VA**

The City of Richmond adapted its pretreatment program to implement this NMC. One key activity is that several industries retain storm water during wet weather events and release flow to the CSS after the event, when sewer system capacity is available. Another related activity is that the discharge of water treatment plant residuals to the combined sewer system is stopped during wet weather events (City of Richmond DPU, 2001).

To properly assess pretreatment requirements in busy industrial areas like New York Harbor, CSS operators must maintain an inventory of the volume and impact of non-domestic discharges to the system.

Photo: Photodisc

Learn More About Them . . .

Additional information about a number of the community CSO programs described in this chapter can be found in Appendix C. Case study communities have this symbol ◆ next to their names.

San Francisco's CSO Oceanside Water Pollution Control Plant treats an average of 17 mgd during dry weather and has 65 mgd peak flow capacity. During wet weather, excess flow is stored in structures that remove sediment and floatables before the flows are transported to the plant for treatment.

Photo: San Francisco Public Utilities Commission

NMC 4: Maximization of flow to the POTW for treatment

The objective of this control is to reduce the frequency, volume, and duration of CSO discharges by taking full advantage of existing facilities to transport and treat wet weather flows. The effectiveness of this control relies on a thorough understanding of the hydraulic response of the CSS and POTW during wet weather and identification of modifications that allow additional conveyance and treatment. Considerations for this control include:

- Determining the capacity of interceptors and pump stations that deliver flow to the POTW.
- Assessing POTW processed flows during wet and dry periods.
- Comparing current flows with the overall design capacity of the POTW and individual unit processes.
- Evaluating the ability of the POTW to operate acceptably at incremental increases in wet weather flow and potential impacts on the POTW's compliance with effluent limits.
- Identifying inoperative or unused treatment facilities on the POTW site that can be used to store or treat wet weather flows.
- Developing cost estimates for physical modifications and related O&M.

An example of implementation:

✦ **South Portland, ME**

South Portland installed an extensive system of real-time flow monitoring equipment to help characterize its collection system and existing CSOs. All CSO outfalls in the system are continuously monitored, and the duration, overflow rate, total volume, and time of day of each CSO is recorded. Flow monitoring has provided many benefits for South Portland's CSO abatement program. The real-time flow data provide basic information for the city to understand CSS performance, enable the progress of the CSO abatement program to be tracked, produce information for comparison of CSO control alternatives, and serve as an important component of compliance monitoring. (Appendix C–South Portland case study)

NMC 5: Prohibition of CSOs during dry weather

Dry weather overflows are illegal under the CWA. The elimination of dry weather overflows was a primary goal of the National CSO Control Strategy. The CSO Control Policy reiterated the importance of eliminating dry weather overflows and made this activity a priority for both implementation and enforcement.

CSO permits generally contain a direct prohibition on dry weather overflows and require the permittee to document and report dry weather overflows to the NPDES authority. Yet, little data on the occurrence of dry weather overflows exist for compilation at the national level. CSO communities are often required to report the annual average number of dry weather overflows observed during reissuance of their NPDES permits. CSO communities usually calculate the annual average number of dry weather overflows based upon data one to three years prior to submitting the NPDES application. Of 301 CSO permit files with associated dry weather overflow information, 278 permits (more than 90 percent) reported no dry weather overflows.

Several methods are used to alleviate dry weather overflows:

- Adjusting regulator settings to keep peak dry weather flows within the combined sewer system.
- Repairing and rehabilitating regulators to correct problems.
- Maintaining regulators to remove dry weather overflow-producing blockages caused by trash and refuse.
- Maintaining tide gates and removing debris to ensure that the gates close properly to prevent tidal intrusions from entering the combined sewer system.
- Cleaning interceptors to remove sediment, roots, and other objects that restrict flow.
- Repairing sewers to reduce groundwater infiltration.

Examples of implementation:

- **Massachusetts Water Resources Authority (MWRA), Boston, MA**
  Through a series of "fast-track" CSO projects, MWRA was able to eliminate dry weather overflows caused by capacity problems or other structural conditions in the metropolitan Boston area. Control of dry weather overflows is currently managed through field operations, including frequent system inspections, routine maintenance, and as-needed maintenance to remove obstructions and make other repairs.
  (Appendix C–MWRA case study)

- **South Portland, ME**
  From 1996 to 1998, all of the dry weather overflows experienced by the City of South Portland resulted from power or equipment failures. The city installed backup power sources at key system locations and is utilizing its network of continuous flow monitors to quickly identify and eliminate dry weather overflows. South Portland reported no dry weather overflows during 1999.
  (Appendix C–South Portland case study)

NMC 6: Control of solids and floatable materials in CSOs

Floatables controls can be implemented in several ways; effectiveness is highly dependent on design, operation, maintenance, and site-specific conditions. Principal options for the control of solids and floatables include:

Floatables control is accomplished through pollution prevention activities such as street cleaning and public education, and through physical controls, such as this netting system serving the Cleveland, Ohio area.

Photo: Northeast Ohio Regional Sewer District

- Prevention of extraneous solids and floatables from entering the CSS, by reducing the amount of street litter and encouraging households not to flush inappropriate items (such as personal hygiene products) down the toilet.

- Removal of solids and floatables from CSOs, using physical controls to keep floatables in the CSS or capture floatables before being discharged to receiving waters. Controls under this option include baffles, trash racks, screens, catch basin modifications, and end-of-pipe netting systems.

- Removal of floatables from surface waters after discharge to receiving waters. The floatables controls under this option include booms and skimmer boats.

Examples of implementation:

❖ **North Bergen, NJ**

North Bergen's solids and floatables controls consist of a netting system that captures solid and floatable material one-half inch and larger in diameter. The city has installed three end-of-pipe netting units, four in-line units, and two floating units to comply with the solids and floatables control requirements of their NJDEP permit. Each unit has either two or four disposable mesh nets which are removed and disposed when full. North Bergen estimates it captures and removes over 40 tons of solids and floatables in these nets each year that otherwise would have been discharged into the Hudson River and various tributaries of the Hackensack River.
(Appendix C–North Bergen case study).

Communities use a variety of pollution prevention techniques to keep floatables from entering the CSSs, including street sweeping.

Photo: NJ Department of Environmental Protection

❖ **South Portland, ME**

South Portland utilizes contracted sweeping services to sweep the entire 104 miles of city roadways each spring following the application of sand and salt over the winter. This process yields over 2,000 cubic yards of material annually. City streets are continually maintained by city personnel during the summer and fall, and an additional 1,000 cubic yards of material is picked up during this period. These activities prevent solids and floatables from entering the CSS.
(Appendix C–South Portland case study and EPA, 1999d).

NMC 7: Pollution prevention

The effectiveness of this minimum control relies heavily on public education and outreach. Pollution prevention activities are far reaching and provide environmental benefits that go beyond CSO control. Specific pollution prevention activities include:

- Solid waste collection and recycling

- Product ban or substitution to reduce problematic packaging waste

- Control of illegal dumping

- Bulk refuse disposal

- Hazardous waste collection

- Water conservation
- Commercial and industrial pollution prevention

Examples of implementation:

Seattle, WA

As part of its Water Smart Technology Program, Seattle Public Utilities offers financial incentives and technical assistance to commercial customers who install water conservation technologies. Incentives are available for replacement of cooling systems and cooling tower modifications, water recycling applications, cleaning processes, toilets, laundry equipment, and irrigation operations with water efficient technologies. Technical assistance is provided in the form of water bill analysis, on-site water audits, life cycle cost analysis, building design, brochures, and speaking engagements (Seattle Public Utilities website).

❖ **Rouge River Program, MI**

As part of its outreach effort, the Rouge River National Wet Weather Demonstration Project in Michigan initiated the "Rouge Friendly Business Program." The program works with small business owners to help them complete a facility management self-assessment form. The program then suggests the implementation of source controls such as storage and disposal of non-hazardous materials, grease handling, and managing outdoor work areas. The program recognizes and promotes businesses that make the suggested changes and demonstrate river-friendly pollution prevention practices. As of 2000, 25 businesses have been officially recognized. As part of the recognition, businesses receive a certificate and a window decal (EPA, 1999d).

NMC 8: Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts

Public notification programs are intended to reduce the exposure of the general public to potential health risks associated with CSO discharges. Techniques used to implement this measure depend on local circumstances and the presence or absence of CSO-impacted recreational and commercial resources. Public notification activities include:

- Posting informational signs at visible CSO outfalls and near outfalls where the public has access to the impacted shoreline.
- Posting signs at affected use areas (e.g., bathing beaches) where use restrictions occur.
- Placing notices in newspapers or on radio or television to alert the public to severe or recurring problems.
- Maintaining telephone hot lines or websites to keep the public appraised of problems and changing conditions.

The Detroit Water and Sewerage Division created Snoop-A-Saurus to increase participation in its Rouge-Friendly Business Program. The logo was also used by the Rouge River National Wet Weather Demonstration Project, which had more public education funding, to broaden exposure.

Photo: Detroit Water and Sewerage Division

Oxbow Meadows is an environmental learning center in Columbus, GA. Columbus also maintains the Uptown Park CSO Technology Demonstration Facility, which is open for public tours and educational activities.

Photo: Columbus Water Works

The Allegheny County Health Department raises orange flags labeled "CSO" near outfalls in Pittsburgh to warn waterfront visitors when CSOs cause or contribute to elevated bacteria levels.

Photo: Photodisc

The effectiveness of this minimum control relies upon the CSO community's ability to tailor programs around site-specific conditions and keep information provided to the public as current as possible. Public notification is effective only if the community is actively engaged and educated.

Examples of implementation:

King County, WA

King County works jointly with the City of Seattle and the Seattle-King County Health Department in posting signs at CSO locations and undertaking public outreach. The Health Department maintains a CSO information line and a website dedicated to CSOs that addresses the following questions:

- What is a CSO?
- Are CSOs a new problem?
- What is the CSO Public Notification Program?
- What does the warning sign look like and mean?
- Why are CSO warning signs going up now?
- What will happen if I go in the water near a CSO sign?
- What if my dog goes in the water near a CSO sign?
- Will I get sick from eating the fish I catch near these signs?
- What is being done to control CSOs?
- What can I do to keep local water safe and clean?
- How much rain does it take for a CSO discharge to occur?
- How long does water stay contaminated after a CSO discharge?
- Can CSOs be eliminated?

(King County CSO Control Program website).

Allegheny County, PA

The Allegheny County Health Department implemented a public notification program designed to warn recreational users of health risks in CSO-impacted waters in the Pittsburgh area. The program includes publishing advisories in local newspapers and producing public service announcements on local television stations to educate the public of the dangers attributable to CSO discharges. The department also places orange warning flags that read "CSO" at 30 locations near CSO outfalls. The flags are raised to warn recreational users whenever CSO discharges cause or contribute to elevated levels of bacteria. The flags are lowered when "safe" levels have returned. The Health Department also established a 24-hour phone line to provide advisory updates (CSO Partnership website).

NMC 9: Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls

Understanding the characteristics of the CSS, the hydraulic response to rainfall, and impacts of CSO discharges is critical to the success of any control program. The expectation of this control is the use of visual reconnaissance and simple monitoring methods to develop a basic understanding of the combined sewer system. More advanced monitoring and modeling during LTCP development and implementation serve to supplement this control. Examples of characterization measures include:

- Assemble maps, reports, and other existing information to provide a reference for CSO assessment.
- Monitor and record the occurrence and frequency of overflows through visual inspection, inspection aids such as chalk and wood blocks, and automatic monitoring equipment.
- Track citizen inquiries, water quality data, and other readily available information on impacts to recreational uses and other impairments.

The effectiveness of this control depends on utilizing available monitoring data and the CSO community's ability to develop and implement simple monitoring measures to characterize the combined sewer system and the magnitude of CSO impacts.

An example of implementation:

✦ **Randolph, VT**

Randolph is using block testing at its two CSO outfalls to determine whether an overflow event has taken place. Block testing is a simple and inexpensive way to evaluate the frequency of CSO discharges. Block testing involves resting a block of wood on the dam or diversion structure at the CSO outfall and checking on a regular basis to see if it has been dislodged by a CSO event. Block testing is being used to confirm the success of local sewer separation efforts and best management practices in reducing overflows at Randolph's CSO locations.
(Appendix C–Randolph case study).

6.4 Implementation of the LTCP

Concurrent with the implementation of the NMC, the CSO Control Policy expects that:

> *Permittees with CSOs are responsible for developing and implementing long-term CSO control plans that will ultimately result in compliance with the requirements of the CWA. The long-term control plans should consider the site-specific nature of CSOs and evaluate the cost effectiveness of a range of control options/strategies.*

CSO communities are generally expected to complete the development of an LTCP within two years of being required to do so in an NPDES permit or other enforceable mechanism.

6.4.1 Status of Documented Implementation of the LTCP

Based on EPA's review of 811 CSO permit files, 275 (34 percent) permittees had submitted a draft LTCP to the NPDES authority and 139 (17 percent) had documented implementation efforts. The review also revealed that NPDES authorities had approved 155 (56 percent) of 275 submitted LTCPs as sufficient to attain water quality standards. The review showed that 30 CSO permittees (11 percent of 275) had initiated implementation of the LTCP while awaiting approval by the NPDES authority. Conversely, 38 CSO permittees (14 percent of 275) with an approved LTCP have not documented with the NPDES authority that implementation has been initiated.

Nine CSO permits (3 percent of 275) had developed and submitted an LTCP despite having no requirements to do so. These nine cases reflect municipalities that are not required to develop an LTCP by their permit (see discussion in Chapter 5 on reasons for not having a requirement), but which moved ahead with development and implementation of CSO controls within the scope of the CSO Control Policy. In most of these cases, municipalities had a basis for CSO planning prior to the issuance of the CSO Control Policy and adapted planning efforts to be consistent with the CSO Control Policy without being required to do so.

6.4.2 Selected LTCP Approach

The CSO Control Policy identified two general approaches for attaining water quality standards: the "demonstration" and "presumption" approaches. Both approaches provide municipalities with targets for CSO control that may meet the water quality-based requirements of the CWA, particularly protection of designated uses.

Based on the 275 LTCPs filed with NPDES authorities:

- 95 (35 percent) followed the demonstration approach.
- 70 (25 percent) followed the presumption approach.
- 110 (40 percent) used a combination of the two approaches, submitted LTCPs prior to the issuance of the CSO Control Policy, or not enough information was obtained during the file review to classify the approach.

Additional information on the demonstration and presumption approaches is provided in Section 2.4.2 of this report.

6.4.3 Specific CSO Control Measures for LTCPs

In reviewing the NPDES authority files, EPA found descriptions of 578 specific CSO controls, beyond the NMC, that have been or will be implemented by 268 permittees as part of an LTCP, or other CSO control program. Documentation of an additional 280 specific CSO controls was found for another 171 CSO communities not required to develop an LTCP. Based upon this review, these 858 controls documented by CSO communities are classified as collection system controls, storage controls, or treatment controls. In general:

- Collection system controls are measures that remove flow from, or divert flow within, the CSS to maximize the conveyance of flow through the combined sewer system to the POTW. This category includes inflow/ infiltration control, pump station capacity upgrades, expanded interceptor capacity, regulating devices and backwater gates, inflatable dams, flow diversion, real-time control, and sewer separation.

- Storage controls are measures that temporarily store combined sewage for subsequent treatment at the POTW once capacity becomes available. This category includes in-line storage, retention basins, and tunnels.

- Treatment controls are measures that reduce the pollutant load in CSO discharges. This category includes coarse screening, primary sedimentation, increased treatment plant capacity, swirl/vortex technologies, and disinfection.

The number of CSO controls documented in the permit files for these three categories is presented in Figure 6.6. The 10 CSO controls that most frequently have been or will be implemented as part of an LTCP are presented in Table 6.3. A detailed summary of all documented CSO controls implemented by the CSO communities as part of an LTCP is presented in Appendix R. The CSO controls implemented or selected for implementation suggest that CSO communities have considered a range of controls as expected by the CSO Control Policy.

As shown in Table 6.3, sewer separation was the most widely implemented CSO control. Complete or limited sewer separation has been implemented or planned by the majority of CSO communities for which documentation of CSO controls was found in the NPDES authority files. Limited sewer separation is a prevalent solution for communities that have small areas served by combined sewers; these areas often lend themselves to separation.

Figure 6.6

Distribution of CSO Control Measures Implemented as Part of an LTCP

CSO controls used as part of an LTCP are relatively evenly distributed between treatment, storage, and collection system improvements. Notably, collection system controls are dominated by sewer separation activities.

Category	#of Permits	Percent
Controls Implemented for LTCP		
Collection System Optimization/Control	387	45.1%
Treatment	258	30.1%
Storage	213	24.8%
Total Controls	**636**	**100.0%**

6.4.4 Minimum Elements of an LTCP

The CSO Control Policy lists nine minimum elements that should be addressed, as appropriate, in the development of an LTCP. This section describes each element, discusses the types of activities to be considered, supplies supporting data where available, and provides CSO community examples for some of the elements.

Characterization, Monitoring, and Modeling

The CSO Control Policy states:

> *Permittees with combined sewer systems that have CSOs should immediately undertake a process to accurately characterize their sewer system.*

and

> *The purpose of the system characterization, monitoring and modeling program initially is to assist the permittee in developing appropriate measures to implement the nine minimum controls and, if necessary, to support development of the long-term CSO control plan.*

System characterization, monitoring, and modeling activities support the selection and implementation of cost-effective CSO controls. Hydraulic responses of the combined sewer systems to wet weather events need to be understood to enable CSO communities to estimate pollutant loadings from CSOs. When the system is properly characterized, the effect of pollutant loads in receiving water under existing conditions and under a series of CSO control options can be evaluated.

System characterizations range from simple to more complex activities that can include:

- Delineating sewershed boundaries.
- Gathering and reviewing existing data on flow, hydraulic capacity, receiving water quality, and rainfall.
- Identifying existing collection system conditions and problems.

Table 6.3

10 Most Frequently Implemented LTCP Controls

LTCPs usually employ a combination of controls. Sewer separation accounts for more than half of CSO control measures found in LTCP documentation. Other measures are more uniformly distributed in the frequency analysis.

LTCP Control	Control Category	Number of Implementations	% of 439 Permits Reviewed
Sewer separation	Collection System	222	51%
Sewer rehabilitation	Collection System	73	17%
Retention basins	Storage	71	16%
Disinfection	Treatment	71	16%
Primary sedimentation	Storage	69	16%
Storage tunnels and conduits	Storage	66	15%
Upgraded WWTP capacity	Treatment	64	15%
Outfall elimination	Collection System	63	14%
Upgraded pump station capacity	Collection System	53	12%
Swirl concentrators/vortex separators	Treatment	31	7%

- Quantifying CSO flows and pollutant loads.

EPA's review of CSO files revealed that 369 (45 percent) of the 811 CSO permit files reviewed contained information on the miles of combined sewer maintained by the CSO community and/or the acres served by combined sewers. This information was typically required as part of the NPDES permit application or included in NMC documentation. The CSO file review also revealed:

- 259 CSO files (32 percent) with documentation of the frequency of CSO events, by outfall, for one or more years.

- 197 CSO files (24 percent) with documentation of annual CSO discharge volumes, by outfall, for one or more years.

- 45 CSO files (6 percent) with receiving water monitoring data.

In addition, EPA's review of CSO files found that 121 (15 percent) contained information indicating that the CSO community intended to develop either a collection system or receiving water model to support development of an LTCP.

Examples of implementation:

Northeast Ohio Regional Sewer District (NEORSD)

NEORSD serves the greater Cleveland metropolitan area. One focus of NEORSD's CSO control is Mill Creek Watershed, the 17,000-acre service area of the Mill Creek Interceptor. System characterization activities implemented by NEORSD within the Mill Creek Watershed Study included:

- Identifying 175 CSO and storm water outfalls discharging to Mill Creek and its tributaries.

- Monitoring at 17 sites to characterize the volume and characteristics of discharges during storms.

- Monitoring at a network of four receiving water stations to characterize flow and quality during dry and wet weather conditions.

- Assessing aquatic life and habitat at 11 sites in Mill Creek for biological health indicators including the Qualitative Habitat Evaluation Index, Invertebrate Community Index, Index of Biological Integrity, and sediment quality and in-stream toxicity.

(WEF, 1999b)

New York City, NY

New York City conducts extensive combined sewer system and receiving water monitoring. The monitoring program data provide the basis for the estimation of CSO flows and loads, and for receiving water quality assessments. The major pollutants of concern are bacteria, BOD, solids, and toxics. By 1998 the city had sampled 124 CSO outfalls for up to five rainfall events, for a total of 600 outfall sampling events. The city has performed over 46,000 analyses to determine the characteristics of CSOs. In addition, the city monitors 52 stations in New York Harbor bimonthly on a year-round basis to track trends.

New York City uses three models to assess the relationship between pollutant sources and water quality response:

- A landside model of the combined sewer system that simulates CSO loads in response to rainfall inputs;
- A hydrodynamic model of circulation in New York Harbor; and
- A water quality model of the Harbor that simulates the fate and transport of pollutants.

The monitoring and modeling program has helped the city to identify priority areas and identify appropriate control measures for these locations (WEF, 1999b).

Public Participation

Coordination and communication with the public and regulatory agencies is important in establishing a basis for communicating CSO issues and in discussing proposed controls during the LTCP process. Given the potential for significant expenditures of public funds to implement CSO controls, establishing early communication with the public is an important first step in the long-term planning approach, and crucial to the success of a CSO control program. The importance of public participation is stressed in the CSO Control Policy:

> *In developing its long-term CSO control plan, the permittee will employ a public participation process that actively involves the affected public in the decision-making to select the long-term CSO controls.*

Examples include:

Birmingham, MI

The City of Birmingham designed its public participation process to educate and involve as many citizens as possible. The process included four primary components:

- Public hearings and notification on siting and funding alternatives for CSO control and abatement projects.
- Creation of an Ad Hoc Citizens' Advisory Committee to review alternative CSO abatement plans as well as design concepts, including site planning, architectural considerations, and park restoration considerations.
- Development and distribution of press background materials (including identification of appropriate contacts within the city to respond to media inquiries) prior to and throughout the construction of a 5.5 mg retention basin.

- Direct mailing to residents in the neighborhood where construction took place.

(CSO Partnership website).

Wilmington, DE

The centerpiece of the City of Wilmington's public participation program was a series of three public meetings on the development of the LTCP. The meetings included presentations covering CSOs in the city, the LTCP process, flow monitoring, the use of computer models to evaluate alternatives, and details on CSO control alternatives under consideration by the city, including costs. Meeting attendees were given the opportunity to comment on the proposed controls and other aspects of the planning process. The city distributed questionnaires designed to encourage attendees to provide suggestions and opinions on CSO control alternatives, the appropriate level of CSO control, priority areas for CSO control, and paying for CSO control. A summary of the question-and-answer portion of each meeting was prepared and distributed to those in attendance (City of Wilmington DPW, 2000).

Consideration of Sensitive Areas

The CSO Control Policy identifies several categories of receiving waters eligible to be classified as "sensitive areas." CSO communities are expected to identify and give the highest priority to controlling CSOs that discharge to sensitive areas during the development of the LTCP. The CSO Control Policy also provides that communities discharging to sensitive areas will be targeted for priority attention from the NPDES authority.

Sensitive areas are defined by the NPDES authority in coordination with other federal and state agencies, where appropriate, and include the following:

- Outstanding National Resource Waters
- National Marine Sanctuaries
- Waters with threatened or endangered species and their critical habitat
- Waters with primary contact recreation (e.g., beaches)
- Public drinking water intakes or their designated protection areas
- Shellfish beds

EPA found information on sensitive areas in 250 (31 percent) of the 811 CSO permit files reviewed. Based on this review, the number of permits with CSOs discharging to the various types of sensitive areas is summarized in Table 6.4. As shown, primary contact recreation waters are the dominant type of sensitive area impacted by CSO discharges.

This summary may not represent a true national picture of discharges to sensitive areas for two reasons. First, CSO communities were given limited guidance on the identification of sensitive areas. Second, some states classify all water bodies as primary

The CSO Control Policy expects CSOs that discharge to sensitive areas, such as salmon spawning streams, will be given highest priority for controls.

Photo: Photodisc

contact recreation waters. Nevertheless, CSO communities do appear to be giving consideration to sensitive areas in the development and implementation of LTCPs.

Examples include:

- **Muncie, IN**
  Muncie's LTCP gives priority to eliminating discharges to sensitive areas. A subcommittee of Muncie's Citizens CSO Advisory Committee was established to determine those areas along the White River considered to be the most sensitive with respect to parks, schools, and places of public use. CSOs that discharge to identified sensitive areas are to be eliminated, relocated, or treated (Appendix C–Muncie case study).

- **San Francisco, CA**
  San Francisco's LTCP gives priority to eliminating discharges to sensitive areas. A CSO outfall at Baker Beach in the Golden Gate National Recreational Area was eliminated on the basis of the sensitivity of the habitat. (Appendix C–San Francisco case study)

- **MWRA, Boston, MA**
  MWRA identified four receiving waters with critical use areas analogous to sensitive areas. The presence of swimming or shellfishing in each receiving water made protection of these resources a priority. MWRA's goal is to reduce the frequency of overflows to zero per year in these areas through implementation of sewer separation and CSO relocation. As shown in Table 6.5, this prioritization has reduced overflows in two of the four critical use areas, with full implementation expected by 2008. (Appendix C–MWRA Case Study)

Evaluation of Alternatives

The CSO Control Policy expects that CSO communities will consider and evaluate a reasonable range of control alternatives during LTCP development. Further, it expects that LTCPs will evaluate options bounded by full control and no control, so that a reasonable assessment of cost and performance could be made. As evidenced by the top 10 CSO controls presented in Table 6.3 and the detailed summary of CSO controls contained in Appendix R, CSO communities

Table 6.4

Sensitive Areas Affected by CSO Discharges

Primary contact recreation waters are the sensitive areas most often impacted by CSO discharges.

Type of Sensitive Area	Number of CSOs	% of 250 Permits Reviewed
Waters with primary contact recreation (e.g., beaches)	178	71%
Other/unspecified	45	18%
Public drinking water intakes/designated protection areas	10	4%
Waters with threatened or endangered species/habitat	9	4%
Shellfish beds	7	3%
Outstanding National Resource Waters	1	<1%
National Marine Sanctuaries	0	0%

Critical Use Area	CSO Control	1997 Baseline	2001	Projected 2008
N. Dorchester Bay	CSO Relocation	78 per year	21 per year (2)	0 per year
S. Dorchester Bay (1)	Separation	22 per year	19 per year	0 per year
Neponset River	Separation	17 per year	0 per year (3)	0 per year
Constitution Beach	Separation	16 per year	0 per year (3)	0 per year

1. Treatment (screening and disinfection) provided in 1997
2. Modified baseline following additional characterization
3. Sewer separation completed in 2000

Table 6.5

MWRA Critical-Use Prioritization Program Results

MWRA developed its LTCP based on a water body use and sensitivity analysis. The program reduced CSO discharges to sensitive areas from 133 to 40 in three years and is expected to eliminate CSOs by 2008.

appear to have considered a range of control alternatives as expected by the CSO Control Policy.

Examples include:

❖ **Richmond, VA**

Richmond considered a full range of CSO control alternatives as part of its Long Term CSO Control Plan Re-Evaluation. The range of alternatives included:

- Sewer separation
- In-system storage
- Disinfection
- High-rate filtration
- Retention basins
- Swirl concentrators
- Sedimentation basins
- Screening
- Additional conveyance capacity
- BMPs and source control
- Expansion of the POTW

CSO controls were evaluated based on a thorough analysis of CSO volume and frequency, water quality, financial impacts, and public input. (Appendix C–Richmond case study)

Cost/Performance Considerations

Cost/performance considerations enable CSO communities to identify and select the most cost-effective level of CSO control, often referred to as the knee-of-the-curve. This is the point at which incremental pollution reduction or water quality improvement diminishes relative to increased cost. As stated in the CSO Control Policy,

> *The permittee should develop appropriate cost/performance curves to demonstrate the relationship among a comprehensive set of reasonable control alternatives that correspond to the different ranges specified...this should include an analysis to determine where the increment of pollution reduction achieved in the receiving water diminishes compared to increased costs.*

This type of analysis provides communities with information necessary to compare LTCP control alternatives in relation to

Before selecting CSO controls such as tunnel storage for wet weather flows, Richmond, VA evaluated many alternatives in view of CSO frequency and volume reductions, control effectiveness, financial impacts, and public input.

Photo: Richmond Department of Public Utilities performance, cost and environmental benefit in choosing the most appropriate solution.

Examples include:

- **Muncie, IN**
  The Muncie Sanitary District (MSD) is currently in the process of selecting cost-effective CSO abatement alternatives for the LTCP. At least eight alternatives are being evaluated using knee-of-the-curve analysis. Storage basins, increased pumping and wastewater treatment capacity, in-system storage, sewer separation, and various combinations of these controls are being considered. Complete sewer separation and "no action" are also included as MSD evaluates alternatives for its LTCP. Additionally, MSD is considering the impact of local sewage rate increases when evaluating alternatives and implementation schedule. (Appendix C–Muncie case study)

Operational Plan

The operational plan provides a framework for the coordinated operation of the CSS and all of its facilities in a manner that reduces overflows and provides maximum levels of treatment to wet weather flows. The CSO Control Policy states that:

> *After agreement between the permittee and the NPDES authority on the necessary CSO controls to be implemented under the long-term CSO control plan, the permittee should revise the operation and maintenance program developed as part of the nine minimum controls to include the agreed-upon long-term CSO controls.*

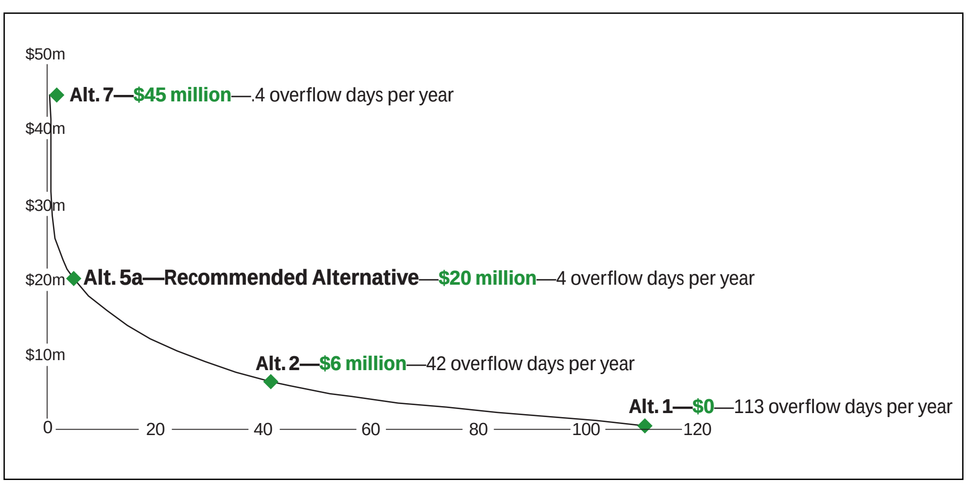
Maximization of Treatment at the Existing POTW

This LTCP element builds upon NMC 4, maximization of flow to the POTW for treatment. The CSO Control Policy expects that:

Figure 6.7

Cost-Benefit Analysis Using Knee-of-the-Curve

Knee-of-the-curve analysis can shed light on the cost-benefit relationships between alternatives. It is often the case that the most expensive alternative yields marginal benefits in comparison to a more affordable option.



In some communities, POTW treatment plants may have primary treatment capacity in excess of their secondary treatment capacity. One effective strategy to abate pollution resulting from CSOs is to maximize the delivery of flows during wet weather to the POTW treatment plant for treatment.

See example provided in Section 6.3.2 of this report.

Implementation Schedule

Development of an implementation schedule is typically based upon a combination of financial, environmental, and other site-specific factors. The CSO Control Policy expects that:

The permittee should include all pertinent information in the long-term control plan necessary to develop the construction and financing schedule for implementation of CSO controls.

The scheduling and phasing of construction activities can be based upon the following:

- Elimination of CSOs to sensitive areas
- Use impairment
- Financial capability
- Grant and loan availability
- User fees and rate structures
- Other variable funding mechanisms and sources of financing

In particular, the CSO Control Policy:

... recognizes that financial considerations are a major factor affecting the implementation of CSO controls...[and]...allows consideration of a permittee's financial capability in connection with a the long-term CSO control planning effort, WQS review, and negotiation of enforceable schedules.

It should be noted that many of the communities nearing full implementation of controls or realizing environmental benefits from CSO controls have worked on CSO abatement since the 1970s.

Post-construction Compliance Monitoring

The CSO Control Policy expects that:

The selected CSO controls should include a post-construction water quality monitoring program adequate to verify compliance with water quality standards and protection of designated uses as well as to ascertain the effectiveness of controls.

CSO communities are responsible for conducting a monitoring program during and after LTCP implementation to aid in determining the effectiveness of the overall LTCP controls in meeting CWA requirements and in attaining water quality standards. Pre- and post-construction monitoring data were not typically found in the data maintained in NPDES authority files.

Like most cities, Chicago maintains excess primary treatment capacity to accommodate wet weather flows. Shown is a primary clarifier at a Chicago-area POTW.

Photo: EPA

6.5 Financial Considerations

Successful implementation of an LTCP rests upon the ability of the CSO community to obtain funding for the selected controls in a sustained manner so that controls can be implemented and paid for over time. The financial capability of the community is a major factor in determining the implementation schedule for the LTCP. In fact, the CSO Control Policy expects:

> *NPDES permitting authorities should consider the financial capability of permittees when reviewing CSO control plans.*
>
> *The method of securing financing is also important. The CSO Control Policy states that each municipality....is ultimately responsible for aggressively pursuing financial arrangements...*

This section outlines the funding options available to CSO communities and describes the specific approaches taken by several CSO communities to secure funding to implement the LTCP.

6.5.1 Funding Options

A variety of capital funding options are available for CSO projects, including:

- Self financing. CSO control self-financing typically occurs through the issuance of bonds, establishment of special reserve funds, or the funding of CSO control projects with annual taxes, water and sewer fees, or other revenues.

- State Revolving Fund (SRF) loans. SRF programs can offer low or zero interest loans, guarantees of repayment, bond insurance, and refinancing of existing debt under certain conditions.

- Federal grants. The federal government has several programs that provide assistance for CSO projects. Most are offered only to small and economically disadvantaged communities.

- State grants. Twenty-eight states have grant programs that vary significantly in funding level and restrictions.

- Other capital funding options. Special assessment districts can be used to fund projects for a specific geographic area (require legal arrangement to charge those receiving the service for capital or operating costs of the project). In addition, proffers or exactions of contribution of land, services, or facilities from private sector development companies for rights to connect to a water/sewer system in the future.

These funding options are not available to every CSO community. For example, some CSO communities may have difficulty obtaining long-term bond financing due to limited experience in obtaining debt financing. In addition, separate grant or loan assistance programs for CSO communities are not available in all states. CSO communities generally identify their best funding options after reviewing all the funding sources, considering benefits and limitations, and determining applicability.

Specific examples of funding option combinations used by CSO communities to cover the costs of CSO control are presented below.

- **Burlington, IA**

  The City of Burlington used a mix of Federal Community Development Block Grants, federal grants, and bonds to finance CSO control. The city has been working on a sewer separation project in the Hawkeye drainage basin since 1988. The total cost of the project is projected to be $13.3 million. In 1998, the city was awarded a Federal Special Infrastructure grant for $7 million. The city is providing the local cost-share for this project through bond issuance and user fees.
  (Appendix C–Burlington case study)

  Western Port, MD

  The town of Western Port, with approximately 2,750 residents, developed a CSO control program that cost nearly $1.5 million to implement. Because of its proximity to and involvement with a local paper company, Western Port was eligible for grant funding from the Federal Bureau of Mines and the Soil Conservation Service. This grant covered one-third of project costs. The community also secured a low-interest SRF loan from the Maryland Department of Environment. The SRF loan covered another third of the project costs. A grant from the Federal Community Development Block Grant program covered one-fifth of the project costs, and a county grant covered 3 percent of the project. The net result was financing from a number of funding sources that enabled Western Port to keep user fees at an acceptable level of 1.2 percent of median household income (EPA, 1995d).

- **Randolph, VT**

  Preliminary engineering and design work for Randolph's CSO abatement program took place between 1991 and 1994. This work was funded through the State Planning Advance Program, with a total cost of approximately $250,000. Randolph spent an additional $2.66 million on LTCP development and CSO abatement by 1997. Funding for this additional cost was obtained through state grants (25 percent), SRF loans (50 percent), and from the town's annual operating budget (25 percent).
  (Appendix C–Randolph case study)

6.6 Obstacles and Challenges

The CSO Control Policy establishes a consistent national approach for controlling discharges from combined sewer systems to the nation's waters through the NPDES permit program. As described in the CSO Control Policy:

The purpose of the [CSO] Policy is to coordinate the planning, selection, design, and implementation of CSO management practices and controls to meet the requirements of the CWA and to involve the public fully during the decision making process.

CSO communities like Bayonne, NJ have invested heavily in CSO control and sewer rehabilitation, a necessity given the age of their sewer infrastructure. Many, however, express frustration over a perceived lack of well-defined environmental endpoints for CSO control.

Photos: NJ Department of Environmental Protection

CSO communities have made progress in developing and implementing CSO controls as required by permits and, in some cases, enforcement actions. But a number of challenges remain before the goals of the CSO Control Policy and the CWA are achieved. These challenges have been articulated by CSO communities and their consultants in a number of formal and informal settings, including: panels and outreach activities on the CSO and other wet weather programs; stakeholder meetings on wet weather issues convened under the Federal Advisory Committee Act; EPA-sponsored listening sessions on impediments to meeting the water quality-based provisions of the CSO Control Policy (EPA, 1999e), surveys by stakeholders including AMSA and the CSO Partnership (Appendix G), and a stakeholder briefing on this Report to Congress (Appendix I).

A common concern expressed by CSO communities is that the application of the CSO Control Policy has not resulted in well-defined endpoints for CSO control. In particular, the presumption approach does not ensure attainment of water quality standards. CSO communities are faced with the decision to move forward with major capital investments for CSO controls under the presumption approach that may not meet water quality-based objectives of the CWA, and with no assurance that additional CSO control will not be required.

EPA has identified the following key concerns expressed by CSO communities in the years since the CSO Control Policy was released:

- Need for additional financial and technical resources
- Complexity of water quality standards review process
- Uncertainty about the roles of EPA and state regulatory agencies
- Applicability of the watershed approach and competing priorities within water programs

This section presents additional information on the challenges faced by CSO communities in implementing a level of control that meets the expectations of the CSO Control Policy.

6.6.1 Resources

The *1996 Clean Water Needs Survey Report to Congress* (CWNS) estimates the investment necessary to address the nation's municipal water quality needs. CSO "needs" are the estimated costs to complete all CSO control projects eligible for SRF funding under the CWA. Needs include costs associated with facilities used in conveyance, storage, and treatment of CSOs. Annual operation and maintenance (O&M) costs, however, are not part of the CWNS. The CWNS estimates that needs associated with CSO controls, excluding O&M, total

$44.7 billion (in 1996 dollars). The CWNS estimate is based on the presumption approach to CSO control, which provides primary treatment for wet weather flows and assumes four to six untreated overflow events per year.

CSO communities raised concerns that the CWNS underestimates the actual level of control that will be needed to meet the requirements of the CWA. In particular, they noted the presumption approach may not provide a sufficient level of control to provide for the attainment of current water quality standards.

6.6.2 Water Quality Standards

The CSO Control Policy identifies attainment of water quality standards as one of its fundamental objectives:

> *A primary objective of the long-term CSO control plan is to meet water quality standards, including the designated uses, through reducing risks to human health and the environment by eliminating, relocating or controlling CSOs to the affected waters.*

Water quality standards consist of designated uses, narrative or numeric criteria to support these uses and an antidegradation policy and implementation procedures to protect the water quality improvements attained. There is considerable variability in the criteria that states use to protect recreational uses because not all states have adopted EPA's *Ambient Water Quality Criteria For Bacteria—1986* (see Table 6.6). The BEACH Act of 2000, discussed above, required Great Lakes and coastal states to adopt by April 2004, the 1986 water quality criteria for bacteria (*E.coli* and/or enterococci).

EPA recommends that states and tribes adopt these criteria for they are more protective of human health for gastrointestinal illness than fecal or total coliform. EPA recognizes the difficulties some states and tribes have had in adopting *E.coli* or enterococci as water quality criteria for bacteria and drafted implementation guidance to assist in the adoption process. EPA expects to publish final implementation guidance by the end of 2001.

The CSO Control Policy encourages CSO communities and states to coordinate the development and implementation of the LTCP with the review and, if appropriate, revision of water quality standards to ensure that the CSO controls will be sufficient to meet water quality standards. The CWA and the CSO Control Policy expect NPDES permits requirements to ensure that CSOs will not interfere with the attainment of water quality standards.

CSO communities, states, and environmental and CSO constituencies have voiced a number of different opinions on the timing of water quality standards reviews in relationship to the development and implementation of the LTCP. EPA recently published *Guidance: Coordinating Long-Term CSO Planning with Water Quality Standards Reviews* to lay a strong foundation for integrating CSO long-term control planning with water quality standards review. 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 guidance outlines a process to facilitate agreement among CSO communities, states, and EPA on the data to be collected and the analyses to be conducted to support both the LTCP development and water quality standards reviews. Integrating the processes should provide greater assurance that CSO communities will implement affordable CSO control programs that meet appropriate water quality standards.

6.6.3 Uncertainty

CSO communities identified a number of areas in which they feel the CSO Control Policy is not explicit. Specific concerns related to:

- The attainment of water quality standards with implementation of LTCP.

Table 6.6

Bacteriological Indicators Used By States

States vary in their use of indicator bacteria to establish water quality standards. Several states use a combination of indicators, but many rely solely on fecal coliform.

Region	State	Freshwater Indicator Bacteria	Marine Indicator Bacteria
1	CT	Enterococci/Fecal Coliform/Total Coliform	Enterococci
	ME	*E. coli*	Enterococci
	MA	Fecal Coliform/Total Coliform	Fecal Coliform
	NH	*E. coli*	Enterococci
	RI	Fecal Coliform/Total Coliform	Fecal Coliform
	VT	*E. coli*	
2	NJ	Enterococci/Fecal Coliform	Enterococci/Fecal Coliform
	NY	Fecal Coliform/Total Coliform	Fecal Coliform/Total Coliform
3	DE	Enterococci	Enterococci
	MD	Fecal Coliform	Fecal Coliform
	PA	Fecal Coliform	
	VA	Fecal Coliform	Fecal Coliform
	WV	Fecal Coliform	
	DC	Fecal Coliform	
4	GA	Fecal Coliform	Fecal Coliform
	KY	Fecal Coliform	
	TN	Fecal Coliform	
5	IL	Fecal Coliform	
	IN	*E. coli*	
	MI	*E. coli*/Total Coliform	
	MN	Fecal Coliform	
	OH	*E. coli*/Fecal Coliform	
	WI	Fecal Coliform	
7	IA	Fecal Coliform	
	KS	Fecal Coliform	
	MO	Fecal Coliform	
	NE	Fecal Coliform	
8	SD	Fecal Coliform	
9	CA	*E. Coli*/Enterococci/ Fecal Coliform/Total Coliform	Enterococci/ Fecal Coliform/Total Coliform
10	AK	Fecal Coliform	Fecal Coliform
	OR	*E. coli*	Fecal Coliform
	WA	Fecal Coliform	Fecal Coliform

- The review and approval process for LTCP.
- The definition of "primary contact recreation waters" as related to sensitive areas.

Attainment of Water Quality Standards

The attainment of water quality standards in urban waters often cannot be achieved solely through CSO control. Other point source discharges, including storm water, and contributing nonpoint sources must also be controlled. Integration of LTCP development in a watershed context would alleviate some concerns about meeting water quality standards and equity. CSO communities are well positioned to participate in watershed efforts, but not well positioned to lead them.

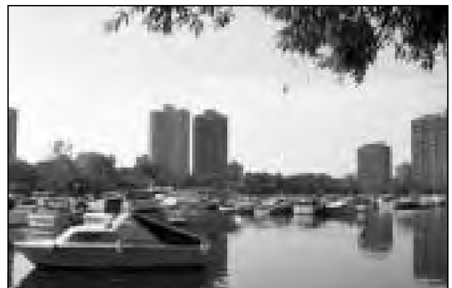
Review and Approval of LTCPs

Of the 275 LTCPs submitted by CSO communities as of June 2001, 180 (65 percent) have received formal approval from the appropriate NPDES authority. The remaining (unapproved) LTCPs are generally being reviewed by the NPDES authority, or being revised based on comments or questions received during the review process. CSO communities are often unable or unwilling to commit to the substantial funding required to implement an LTCP without prior review and approval by the NPDES authority. Further, EPA has not issued guidance specific to the review and approval of LTCPs. The combined result has been delay in implementing some LTCPs. Delays can result in the need to revise an LTCP to reflect new data and cost information.

Sensitive Areas and Primary Contact Recreation Waters

The CSO Control Policy defines sensitive areas to include:
(1) Outstanding National Resource Waters, (2) National Marine Sanctuaries, (3) waters that provide habitat for threatened or endangered species, (4) waters with primary contact recreation, (5) waters used for public water supply, and (6) shellfish beds. NPDES permitting authorities, however, have substantial discretion in designating sensitive areas.

CSO stakeholders have voiced concern that most states use fishable/swimmable as their default designated use. Consequently, if waters with primary contact recreation is interpreted broadly, it could trigger sensitive area designations for a large percentage of receiving waters nationwide. These stakeholders assert that during the CSO Control Policy development negotiations, criterion 4 above was expressed in terms of swimming or bathing beaches or beaches with contact recreation. In the CSO Control Policy, however, the language reads, “waters with primary contact recreation.” Stakeholders reiterated that this is a critical distinction.



Marina on the Chicago River, Chicago. In urban areas, CSO control alone will not achieve attainment of water quality standards. Other pollution sources must also be evaluated and addressed, such as storm water, nonpoint source runoff, and commercial sources.

Photo: David Riecks

6.6.4 The Watershed Approach

The CSO Control Policy provides that:

> *"Permitting authorities are 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."*

Despite this provision, CSO communities raised concerns over the way EPA and NPDES authorities compartmentalize the management of water programs. This compartmentalization impedes holistic management of wet weather water quality problems on a watershed basis. Many CSO communities have to implement controls and extensive planning, monitoring, and reporting efforts for a variety of wet weather and related programs that are not well coordinated at the NPDES authority level. These include:

- Phase I NPDES permit requirements for municipal separate storm sewer systems (MS4s) serving communities with over 100,000 population, and for storm water discharges associated with industrial activity, including construction activity disturbing at least five acres of land;
- Phase II NPDES permit requirements for MS4s serving smaller communities and construction sites (to be implemented by March 2003);
- Sanitary sewer overflow (SSO) management activities under permitting and enforcement requirements developed by states and EPA regions;
- Source Water Assessment and Protection Programs, under the 1996 Safe Drinking Water Act Amendments, to identify potential threats to areas serving as sources of drinking water and to implement protection efforts; and
- TMDL studies, wasteload allocations for point sources, and load allocations for nonpoint sources.

These programs often have separate implementation schedules and monitoring, outreach, and reporting requirements. Leadership in developing an LTCP to consider watershed issues is often absent.

An example of a CSO community taking the lead on watershed-wide issues:

Louisville, KY changed its approach to water quality monitoring to support its watershed-based management program. Instead of monitoring to just to meet permit requirements, subwatersheds are monitored for water quality changes. The results are used to support sewer system modeling, planning, and management decision-making.

Photo: National Oceanic and Atmospheric Administration

Louisville & Jefferson County Metropolitan Sewer District, KY (LJCMSD)

LJCMSD has worked to integrate five local programs covered by NPDES permits, including CSOs, using watershed-based monitoring and management strategies. LJCMSD identified a lack of coordinated monitoring and assessment data as the biggest obstacle to improving water quality. Each permit program had its own staff, priorities, operating procedures, sampling program databases, and lists of facilities. Little information-sharing took place between programs, and field personnel were spread thin, with two- and three-person teams trying to cover enormous areas during the same wet weather event, often gathering different samples at the same locations. It was nearly impossible to establish long-term monitoring sites throughout LJCMSD for each of the five NPDES programs. LJCMSD developed a Combined Annual Report (a unified report format) that considers permit requirements and watershed issues as a whole. This effort has improved the effectiveness of LJCMSD's management activities and the ability of LJCMSD to track progress. (Appendix C–Louisville & Jefferson County Metropolitan Sewer District case study)

6.7 Performance Measures and Environmental Benefits

As a matter of policy, EPA encourages communities to monitor and track environmental benefits associated with CSO control. The CSO Control Policy specifies:

> *...selected CSO controls should include a post-construction water quality monitoring program adequate to verify compliance with water quality standards and protection of designated uses as well as to ascertain the effectiveness of CSO controls.*

The overall goal of the prescribed post-construction monitoring is to determine compliance with the CWA and the overall effectiveness of the LTCP in achieving water quality standards. The CSO Control Policy did not establish or recommend any other programmatic measures of performance for CSO communities that could be used to quantify and document the results and effectiveness of CSO controls.

6.7.1 CSO Performance Measures for CSO Communities

In 1996, AMSA, in cooperation with EPA, published *Performance Measures for the National CSO Control Program* (AMSA,1996). The purpose of the report was to establish a recommended series of performance measures for use by communities to track improvements and results associated with CSO control. The report identified and described 24 performance measures grouped into four broad categories (Table 6.7).

These categories of performance measures paralleled those identified for permitting authorities' consideration in EPA's *Combined Sewer Overflow Guidance for Permit Writers* (see Section 5.8 for a discussion of these categories).

6.7.2 Loading Reduction and Environmental Benefits

Establishing CSO performance measures provides the foundation for assessing loading reductions and environmental benefits. The administrative and end-of-pipe categories provide a direct measure of CSO reduction and controls. The receiving water and ecological/human health/resource use categories provide a direct measure for assessment of environmental benefits achieved from CSO control.

These indicators are generally the result of analysis from extensive monitoring and tracking programs. Monitoring and tracking programs are complicated by several factors. Chief among them is that many measures, particularly water quality measures, require monitoring during wet weather conditions. Monitoring during wet weather conditions cannot be scheduled in a routine manner, but must instead be scheduled in response to CSO-producing rainfall events. Another complicating factor is that weather conditions and rainfall totals are highly variable from storm to storm and year to year, making comparisons difficult. Monitoring programs need to be targeted and implemented in a consistent manner from year to year to be able to establish pre-control baseline conditions and to identify meaningful trends over time as CSO controls are implemented.

In practice, it is often difficult, and in some instances impossible, to link environmental conditions or results to a single source of pollution, such as CSOs. In most instances, water quality is impacted by multiple sources, and trends over time reflect the change in loadings on a watershed scale from a variety of environmental programs.

6.7.3 Data, Findings and Examples

Although the methodology for this report did not emphasize the collection of data on loading reductions or environmental benefits, EPA did seek out existing, readily available data that could be used to measure of environmental benefits attributable to CSO control. Most relevant data and information were based upon local data submitted by CSO communities in annual or periodic reports, and from information collected and documented in the case studies (see Appendix C).

Table 6.7

CSO Control Performance Measures

A major part of CSO control is assessing the effectiveness of the controls and measuring improvements in receiving waters. Common sense, local conditions, and cost-effectiveness should drive the selection of performance measures.

1—Administrative

- Documented implementation status of NMC
- Documented implementation status of LTCP
- Waste reduction

2—End-of-Pipe

- Flow measurement
- Wet weather flow budget
- CSO frequency
- Frequency in sensitive areas
- CSO volume
- Volume in sensitive areas
- Dry weather overflow
- Pollutant load reduction
- BOD load
- TSS load
- Nutrient load
- Floatables

3—Receiving Water

- Dissolved oxygen trend
- Fecal coliform trend
- Floatables trend
- Sediment oxygen demand trend
- Trends of metals in bottom sediments

4—Ecological/Human Health Resource Use

- Shellfish bed closures
- Benthic organism index
- Biological diversity index
- Recreational activities
- Beach closures
- Commercial activities

EPA's observations on tracking CSO loading reductions and environmental benefits are as follows:

- Most of the available data necessary to assess environmental benefits originate from the CSO communities in databases or published reports.

- Data submitted by CSO communities on CSO control program effectiveness and loading reductions are not compiled at the state level in a way that can be easily assessed or distilled.

- The limited available information on environmental benefits comes mainly from CSO communities that initiated CSO controls prior to the CSO Control Policy and constructed facilities intended to protect water quality and designated uses. These communities are farther along than communities still in the LTCP development and early implementation stages.

- Environmental benefits associated with CSO control may also be attributable and non-distinguishable from other wet weather program controls that have been put in place.

While a national assessment of performance measures could not be undertaken, EPA's review of select CSO community materials clearly shows that major improvements in flow and load reduction and water quality have been documented in a few cases. Examples of performance measures and associated environmental results for CSO communities follow this discussion. The information provided on environmental results draws substantially on material from CSO communities that initiated CSO control programs before the CSO Control Policy. The benefits realized in these CSO communities are likely to be achieved by other communities as more and more CSO control solutions are implemented.

Examples of Loading Reductions

✥ **Chicago, IL**

The frequency of CSO discharges in Chicago has decreased from 80 per year to 15 per year due to construction of the Metropolitan Water Reclamation District of Greater Chicago's Tunnel and Reservoir Plan (TARP) system. In addition, the volume of combined sewage captured and treated in TARP reached a cumulative total of 565 billion gallons in 2001. (Appendix C–MWRD Case Study)

✥ **Saginaw, MI**

The majority of the City of Saginaw is served by combined sewers, which discharge during wet weather into the Saginaw River. In 1990, an estimated 2,928 million gallons per year of CSO was discharged. Development of a plan to construct seven retention treatment basins for CSO control was also initiated in 1990. Implementation of this plan reduced overflows to 760 million gallons of treated overflow per year, and eliminated the direct discharge of untreated combined sewage under virtually all circumstances. The range of

Table 6.8

Pollutant Removal Capability of Retention Treatment Basins on the Saginaw River

Wet weather retention treatment basins have helped reduce CSO discharges by 75% and yielded similar pollutant removal rates in Saginaw, MI.

CSO Variable	Percent Removal
Volume	22—59%
BOD	50—83%
TSS	50—82%
Phosphorus	35—78%
Ammonia	39—84%

pollutant removal accomplished in the retention treatment basins is presented in Table 6.8. (Appendix C– Saginaw Case Study)

✥ LJCMSD

LJCMSD operates a combined sewer system in a heavily urbanized area that covers 24,000 acres. Within the system, 115 CSOs discharge to the Ohio River and tributaries that cross through Louisville and neighboring communities. LJCMSD has submitted a draft LTCP that includes sewer separation and a variety of other CSO controls. Partial implementation of this plan has yielded the elimination of 5 CSOs, a 27-percent reduction in CSO frequency, and a 13-percent reduction in CSO volume. Substantial additional benefits are expected to accrue when the LTCP is fully implemented. (Appendix C–Louisville & Jefferson County Metropolitan Sewer District case study)

Examples of Environmental Benefits

New York City, NY

New York City has operated a monitoring program to assess pollution in the New York Harbor since 1909. As stated in the 1998 New York Harbor Water Quality Survey:

Through developments and upgrades to New York City's sewage treatment system, as well as operational improvements implemented over the past 10 years, and a suite of aggressive and innovative pollution control programs, the New York City Department of Environmental Protection has:

- *Virtually eliminated raw sewage discharges.*
- *Reduced illegal discharges by more than 90 percent.*
- *Increased wet weather floatables capture to almost 70 percent.*
- *Reduced toxic metals loadings to the waste stream from industrial sources by over 90 percent.*

As a result of these actions there is strong evidence of improvement to New York Harbor's water quality and surrounding environment. These range from the reestablishment of breeding populations of herons, egrets and other waterfowl in several areas of the Harbor, to improved benthic communities in the lower New York Bay and include:

- The opening of all New York City public beaches for the first time since 1922 and the lifting of wet-weather swimming advisories for all but three of the beaches.
- The upgrading of 68,000 acres of shellfish beds since 1985 and the removal of shell fishing restrictions for 30,000 acres in Raritan Bay.
- The reestablishment of Hudson River Shortness sturgeon.

- A 50-90 percent reduction from peak levels of priority pollutants in fine-grained sediment in the Hudson River. Further evidence of improvement in water quality is presented in Figure 6.8, showing long-term trends of improving dissolved oxygen (increasing) and fecal coliform (decreasing) conditions in New York Harbor. These trends are due to a combination of pollution control programs including CSO control, wastewater treatment improvement and expansion, and other point and nonpoint source controls (NYCDEP, 1999).

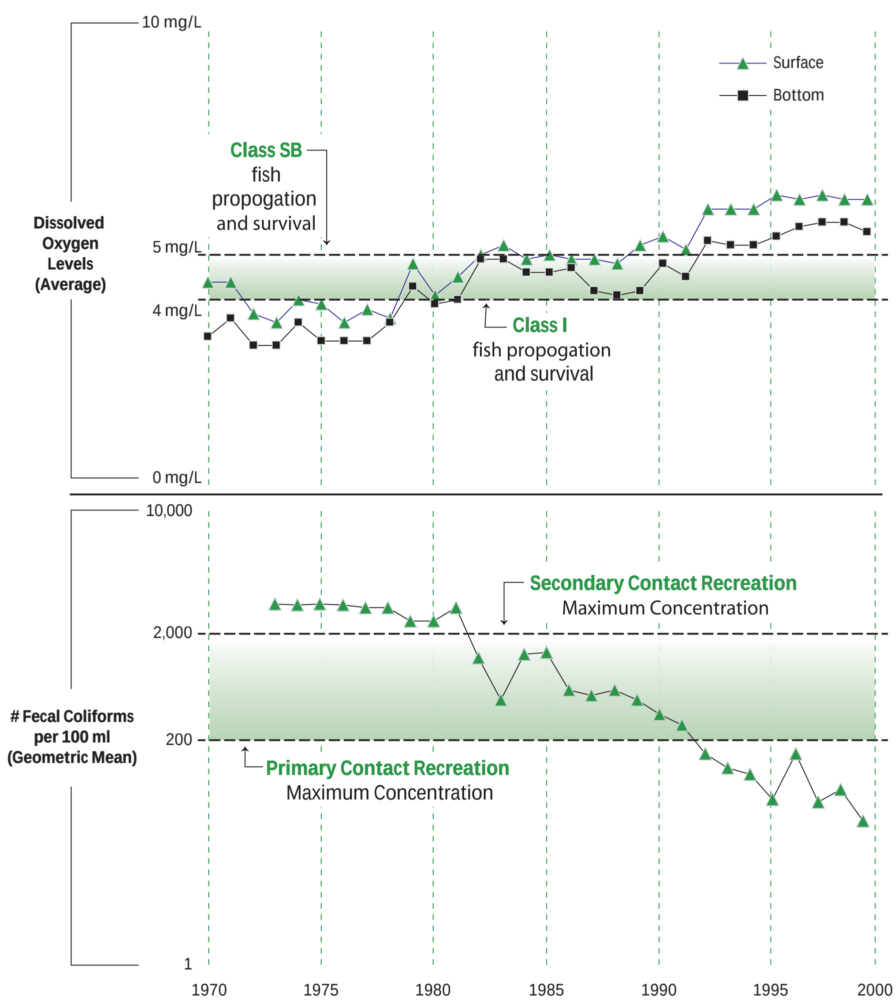


Figure 6.8

New York Inner Harbor Water Quality Improvements Due to Pollution Controls

Over a 20-year period, dissolved oxygen levels have increased and fecal coliform counts have decreased as a result of ongoing pollution control programs, including implementation of CSO controls.

Columbus, GA

Columbus fully implemented CSO control program includes POTW upgrades, sewer separation, new water resource treatment facilities, and a variety of pump station and collection system improvements. Monitoring on the Chattahoochee River shows that water quality and beneficial use improvements have been the direct result of CSO control. The Chattahoochee now meets water quality standards for fecal coliform and other parameters. The river in the downtown area is also free of trash, oil and grease, and other sewage debris. In addition, the City constructed a river walk and other riverside amenities that benefit residents and visitors in conjunction with CSO controls. As part of its LTCP, Columbus constructed two remote facilities to provide treatment for excess wet weather flows. The documented pollutant removal capability of the two treatment facilities is presented in Table 6.9. (Appendix C–Columbus case study)

Table 6.9

Pollutant Removal Capability of Two CSO Treatment Facilities in Columbus, GA

Remote wet weather treatment facilities, combined with improvements to the CSS, have reduced annual discharges of CSO contaminants by at least 52%.

Pollutant	Removal as % of Annual Load
BOD	55—61%
TSS	52—62%
Fecal coliform	95—99%
Copper	66—75%
Lead	62—83%
Zinc	62—82%

Rouge River Program, MI

The Rouge River National Wet Weather Demonstration Project covers 467 square miles of mostly urbanized areas in the greater Detroit area of southeastern Michigan. CSO controls have been implemented since the late 1990s, and the demonstration project's monitoring program is beginning to show environmental benefits associated with CSO control. Some of the key results and accomplishments are:

- About 30 miles of the Rouge River that was CSO-impacted in 1994 are now completely free of uncontrolled CSO discharges.

The first two years of performance monitoring data for the first six CSO basins shows the following:

- About 72 percent, or 933 million gallons, of combined sewage that previously went to the river was captured and treated at the Detroit POTW.
- Previously untreated overflows that occurred in excess of 50 times/year are now treated and occur from one to seven times per year.
- Results from continuously monitored stations show improvements in river dissolved oxygen conditions due to upstream CSO control projects and other watershed management measures/changes.
(Appendix C–Rouge River Case Study)

Rochester , NY

Abatement of CSOs in Rochester dates back to planning that occurred in the 1960s and to initiation of CSO controls during the 1970s. The Monroe County Rochester Pure Waters District implemented numerous CSO projects over the past three decades. These include construction of a deep rock storage and conveyance tunnel system, construction of new treatment facilities, and improvement of existing facilities. Benefits associated with this mature CSO control effort are numerous and include increased recreational use of previously impacted waterways and land-based riverfront redevelopment. An example of the improved water quality condition in the Genesee River below the CSO area is presented in Figure 6.9 (AMSA, 1996).

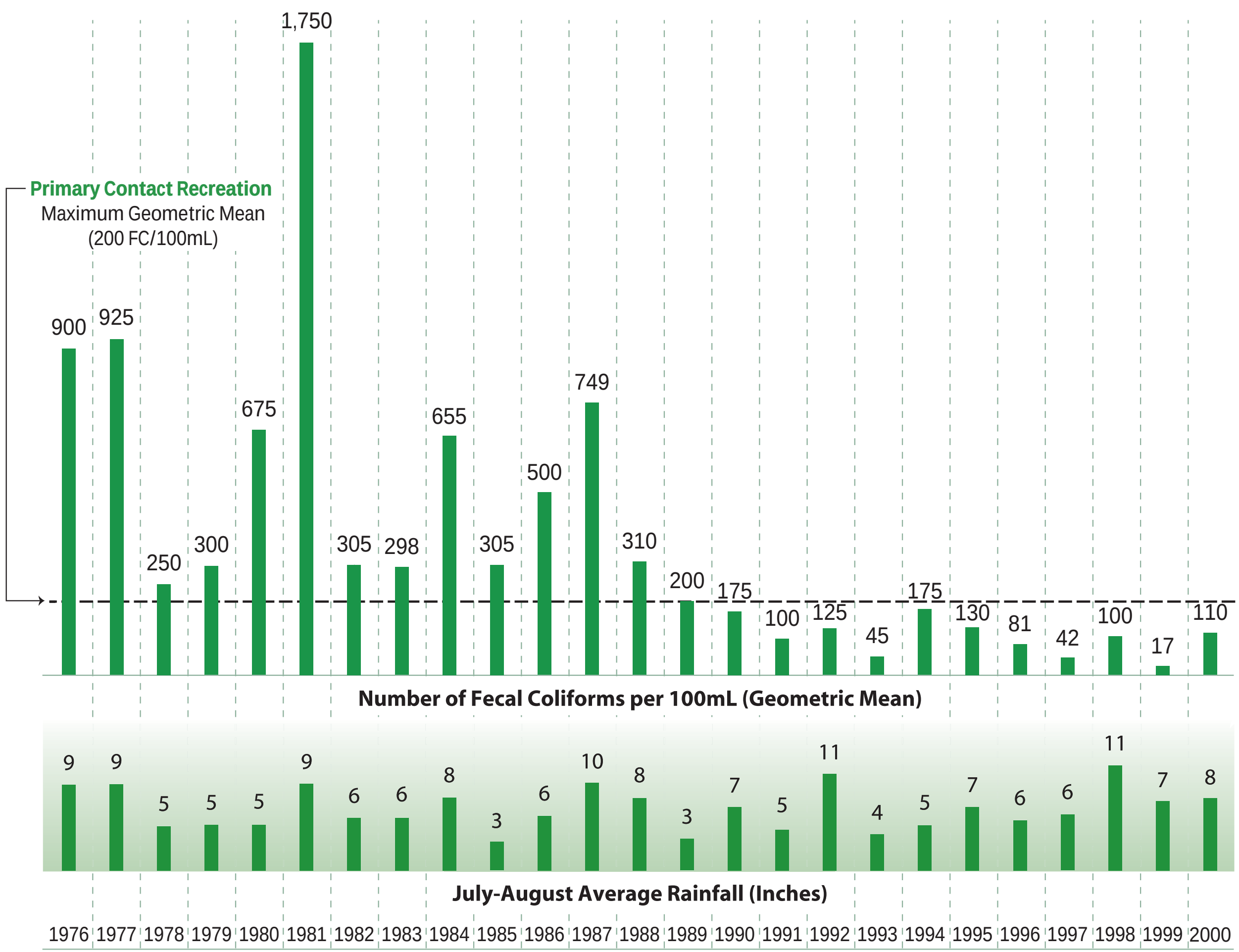
Minneapolis/St. Paul, MN

The twin cities of Minneapolis and St. Paul, Minnesota, completed separation of their combined sewer system in summer 1996. This marked the completion of a $332-million program to eliminate over 21,000 acres of combined sewers. The separation has reduced fecal

Figure 6.9

Genesee River Water Quality Improvements Due to CSO Controls

The City of Rochester has documented a 20-year reduction in fecal coliform below its CSO outfall due to additional storage and improved treatment capabilities.



coliform levels in the Mississippi River and has been credited with the marked increase in game fish population in the metropolitan area near the twin cities.

An indicator of improved water quality is the return of the may fly, which requires clean water to complete its life cycle (CSO Partnership website).

- **San Francisco, CA**
  San Francisco has been engaged in CSO planning and management since 1970, and its LTCP was fully implemented in the late 1990s. The city has an ongoing sampling program to evaluate the problems caused by overflows and to assess the environmental improvements gained from the program's implementation since 1972. CSO volume and frequency and CSO pollutant loads have been reduced substantially since CSO controls were implemented. Beach closings were reduced, directly benefitting the city's swimming, surfing, and sailboard enthusiasts. A summary of environmental benefits associated with CSO control in San Francisco is contained in Table 6.10. (Appendix C–San Francisco case study)

6.8 Findings

CSO Demographics

- There are 859 CSO permits issued to 772 CSO communities.
- 642 permits regulate POTWs serving combined sewer areas; 185 permits regulate SCSs.
- EPA estimates:
  - 30% serve areas with populations less than 10,000
  - 50% serve areas with populations less than 25,000
  - 70% serve areas with populations less than 75,000
- CSO outfalls are permitted to discharge to the following types of water bodies: rivers (43 percent), streams (38 percent), oceans/estuaries/bays (5 percent), ponds/lakes (2 percent), and others such as ditches, canals, unclassified, etc. (12 percent).

CSO Control Implementation

- Many municipalities have CSO requirements in NPDES permits or enforceable mechanism (e.g., order, decree) and are taking action to address CSO controls.

Table 6.10

Benefits of CSO Controls in San Francisco Harbor

Since implementing CSO controls, San Francisco has reduced the number of CSO events and pollutants of concern by an average 88%, and beach closings have been reduced by 94%.

Item	Before CSO Control	After CSO Control	% Reduction
Number of CSO events	58–80	1–10	75–98%
Annual CSO Volume (MG)	7,500	1,350	81%
Suspended Solids Discharge (tons/year)	3,550	450	87%
BOD5 Discharge (tons/year)	2,700	300	89%
Beach Postings (days/year)	200	12	94%

- 91 percent of communities have implemented some CSO controls as a result of permit or enforcement requirements, or on a voluntary basis.

- 77 percent documented implementation of at least one of the NMC as described in the CSO Control Policy; 32 percent documented implementation of all NMC

- The most commonly reported measures to implement the NMC were improving operation and maintenance, maximizing collection system storage, maximizing flow to the POTW, and elimination of dry weather overflows.

- 34 percent have submitted draft LTCPs; another 34 percent have documented implementation of CSO controls that were not developed as part of an LTCP.

- Communities with LTCPs are pursuing attainment of water quality standards in roughly equal measure under three approaches – demonstration, presumption, and a combination.

- Communities are relying on a wide range of technological approaches to address CSOs including storage (e.g. tunnels), expanded treatment capacity, sewer separation, and improved conveyance.

- Communities are using a combination of local funding sources, SRF loans, state grants and loans and——in special cases—line item congressional appropriations to fund CSO controls.

Obstacles and Challenges

- CSO LTCP controls typically involve major infrastructure investments that often compete with other infrastructure activities.

- Many reasons, including institutional barriers, exist for the lack of coordination between the LTCP development and water quality standards review processes. States cite public pressure to maintain their water quality standards, EPA requirements for UAAs, and the lack of water quality monitoring data that could be used to justify standards revisions. Municipalities consider the lack of a clear water quality-based endpoint to be a major impediment to development of LTCPs that will provide for CWA compliance, particularly when urban waters are affected by more than CSOs.

- Municipal data on efficacy of the NMC and LTCPs are highly variable and not easily accessible to EPA and the states. Municipal data on the environmental and public health impacts and improvements are very site-specific and not easily collected or distilled.

- CSO communities have to implement controls and extensive planning, monitoring, and reporting efforts for a variety of wet weather and related programs that are not well coordinated at the NPDES authority level. These programs often have separate implementation schedules and monitoring, outreach, and reporting requirements.

Loading Reductions and Environmental Benefits

- To the extent that environmental data necessary to assess the environmental impacts of CSO and the benefits achieved from CSO controls is collected at all, it is done at the community level. Most environmental benefits cited in this report are site-specific and generated from community-level reporting or through research for case studies.

- The limited data available indicate marked improvements in water quality for some communities implementing controls; however, it is difficult to attribute improvements to any one source of controls when other wet weather program controls are also being implemented (e.g., storm water, TMDLs, etc.).

Chapter 7

Evaluation of the CSO Control Policy

Activities undertaken by EPA, states, and CSO communities to implement and enforce the CSO Control Policy were discussed in Chapters 4, 5, and 6, respectively. This chapter synthesizes the findings from earlier chapters to evaluate the progress of the CSO Control Policy in controlling CSOs and protecting human health and the environment. In particular, this evaluation assesses the CSO Control Policy in the following areas:

- General implementation and enforcement.
- Adherence to the four key principles of the CSO Control Policy.
- Accomplishments attributable to implementation and enforcement of the CSO Control Policy.

This chapter concludes with a discussion of next steps to be taken by EPA based on report findings.

7.1 Implementation and Enforcement of the CSO Control Policy

There has been definite progress in implementing and enforcing CSO controls prior to, and as a result of, the CSO Control Policy. The strength of the CSO Control Policy is its recognition of the site-specific nature of CSOs and the flexibility given to states and CSO communities to develop cost-effective approaches to achieving CSO control. The CSO Control Policy provides a federal and state level of recognition of the importance of controlling CSOs, stimulating dialogue at the local CSO community level, and satisfying a need to get communities moving toward CSO control. Significant investments have been made by some CSO communities to reduce the frequency, volume, and duration of CSOs. Increased protection of human health and water quality has been documented in a number of these cases.

In this chapter:

Storm drain stencil project in a New Jersey CSO community. Most CSO permittees generally follow the concept of the NMC in their CSO control programs.

Photo: NJ Department of Environmental Protection

However, while progress has been made with respect to implementation and enforcement of CSO controls, challenges remain. Outside of judicial enforcement cases, there is limited implementation oversight by EPA, and there are still a number of CSO communities that have not made significant progress in controlling CSOs. Further, the issuance of a policy as opposed to a regulation impacted implementation and enforcement of CSO controls. The variability in program implementation and enforcement described in Section 7.2.2 is due in part to states' decision-making (how to implement within the NPDES process, what to require, what could be required, and timing of requirements). In some cases, states obtain funds and legal support based on new regulations which they must implement, not policy. Additional resources to implement and enforce the CSO Control Policy were not provided or prioritized by the states themselves because it is a policy. Some states must place NPDES-related requirements into state regulatory code and have been challenged by its legislatures as to the necessity for a regulation to implement a policy.

7.1.1 Implementation of the CSO Control Policy

According to data collected for this report, there are currently 772 CSO communities with 859 NPDES permits for CSSs in 32 states, which authorize discharges from 9,471 CSOs. Reductions in the number of CSS permits and CSOs have been observed since the issuance of the CSO Control Policy. This is due to increased efforts by states and CSO communities to control CSOs (e.g., sewer separation, more effective operation and maintenance, etc.) and to the fact that some systems had previously been inappropriately identified as CSSs by NPDES authorities.

Of the 859 NPDES permits that authorize CSOs, a significant number (740 or 86 percent) contain conditions that generally follow those delineated in the CSO Control Policy, and a smaller number (67 or 8 percent) contain other types of conditions to control CSOs. There are 52 CSO permits without enforceable requirements to address CSOs. Where the requirements to address CSOs were absent from the NPDES permit, a number of reasons were cited by NPDES authorities: (1) CSO permits are simply part of the permit backlog and have not yet been reissued, (2) CSOs may not be a top permitting priority in states where only a small number of CSOs exist, and (3) LTCP efforts are beyond the financial or technical capabilities of the owners/operators of some CSSs.

In examining CSO controls, the concept of the NMC has generally been followed by NPDES authorities and implemented by CSO communities. As described in Chapter 5, most NPDES authorities have established a set of controls for CSOs to meet the technology-based requirements of the CWA, the majority of which follow the NMC delineated in the CSO Control Policy. In some cases NPDES authorities took advantage of the flexibility provided in the CSO Control Policy. As a result, the technology-based controls required by some NPDES authorities exceeded the NMC as identified in the

CSO Control Policy. Only a limited number of NPDES authorities regulating a small number of CSO communities require less than the NMC.

Based upon EPA's review of 811 CSO permit files, 34 percent have submitted LTCPs, and 17 percent have documented some LTCP implementation. NPDES authorities have approved slightly more than half of the submitted LTCPs as sufficient to attain water quality standards. Several reasons may explain the current status of LTCP implementation:

- Delays in issuance of NPDES permits and enforceable mechanisms to require LTCP development and implementation.
- Delays in issuance of guidance related to LTCP development. Although the basic guidance for developing LTCPs was published by EPA in 1995, specific guidance related to financial capability assessment and monitoring and modeling guidance was not published until 1997 and 1999, respectively. In addition, EPA did not issue guidance on how development of LTCPs can be better integrated with reviews of water quality standards until August 2001.
- Delays in review and approval of submitted LTCPs, possibly due to the absence of explicit guidance, criteria, training, and benchmarks.
- Uncertainty on the part of CSO communities on their ability to attain water quality standards without control of other sources.
- Lack of oversight at all levels, and a lack of information with which to perform oversight (e.g., there are no standard reporting requirements).
- Inadequate resources and funding at the EPA, state, and local levels to facilitate development, review, approval, and implementation of LTCPs.

7.1.2 Compliance and Enforcement

As described in Chapters 4 and 5, some focused CSO compliance (e.g., inspections and monitoring) and enforcement activities have occurred. For example, several states have promulgated specific CSO enforcement policies, while other states and EPA regional offices have developed a Performance Partnership Agreement (PPA) from which state CSO enforcement policies developed. There also has been effective coordination within EPA in establishing compliance requirements. EPA has issued three memoranda, each intended to facilitate the implementation, compliance, and enforcement of the CSO Control Policy.

Based on compliance and enforcement data collected for this report:

- Judicial cases brought by EPA under the 1984 National Municipal Policy were an important factor in bringing about early CSO control programs in major municipalities.
- Thirty-two administrative actions and five judicial actions have been initiated by EPA in response to

CSO-relateded violations of NPDES permits or the CWA.

- State enforcement actions addressing CSO violations have resulted in 92 administrative actions, one civil judicial action, and 43 joint state-EPA or other state actions.

Even in light of these efforts, most EPA regions and states continue to approach compliance and enforcement as part of routine oversight of POTW operations (e.g., inspections of CSOs and CSO controls are performed in conjunction with inspections of POTW operations). In response to the concern over the threat to public health and the environment resulting from CSOs, EPA issued the *Compliance and Enforcement Strategy Addressing Combined Sewer Overflows and Sanitary Sewer Overflows* in 2000 (EPA, 2000b) to increase federal and state enforcement and compliance assistance.

CSO inspections are typically performed in conjunction with inspections of POTW operations.

Photo: Photodisc

EPA has also initiated a variety of compliance assistance activities to promote compliance with the CSO Control Policy requirements. This compliance assistance, initiated by EPA headquarters and regions, is provided through training and on-line systems, including the Local Government Environmental Assistance Network (LGEAN). Compliance assistance for CSOs is also being provided in a few states. More needs to be done in this area at both the federal and state levels.

While EPA has identified CSOs as a national priority, oversight of compliance and enforcement activities has been difficult. Overall challenges associated with compliance and enforcement of CSO controls include:

- Compliance and enforcement is somewhat limited by a lack of enforceable conditions in some cases (e.g., see discussion in Section 7.2.1 related to clear levels of control). NPDES authorities can evaluate compliance in terms of whether a CSO community is implementing the NMC, but it is difficult to determine the adequacy of implementation (e.g., is enough being done to maximize flow through the treatment plant or to control floatables?).

- The level of CSO compliance inspection and monitoring varies from region to region and state to state. As CSO occurrences are rainfall driven it is difficult to schedule sampling and compliance inspections during wet weather.

7.2 Observations Related to the Four Key Guiding Principles of the CSO Control Policy

This section discusses whether implementation and enforcement of the CSO Control Policy generally followed the four key principles to ensure that CSO controls are cost-effective and meet the objectives of the CWA. The four key principles are discussed in the following subsections.

While the four key principles are used as an analytical framework for assessment of the CSO Control Policy, it is acknowledged that some overlap occurs among the principles.

7.2.1 Provide Clear Levels of Control to Meet Appropriate Health and Environmental Objectives

As described in Chapter 2, provisions contained within the CSO Control Policy provide a number of options for controlling CSOs under the framework of the NMC and LTCPs. The CSO Control Policy also acknowledges that significant efforts have already been undertaken by many NPDES authorities and CSO communities to control CSOs. The CSO Control Policy provides for these existing efforts:

> *...portions of this Policy may already have been addressed by permittees' previous efforts to control CSOs. Therefore, portions of this Policy may not apply, as determined by the permitting authority on a case-by-case basis.*

The flexibility in the CSO Control Policy allowed for site-specific control solutions to be developed, previously implemented controls to be credited and considered, and for exceptions from policy requirements if existing controls demonstrated attainment of water quality standards. However, in light of this flexibility, data collected for this report indicates that clear levels of control from the standpoint of definitive compliance end-points have not yet been provided to a number of CSO communities by NPDES authorities.

NMC

As described in Chapters 5 and 6, the NMC have provided a minimum technology-based level of control for CSOs. The examples of NMC implementation provided in Chapter 6 and in the case studies presented in Appendix C demonstrate that the NMC contribute to reductions in CSO volume, frequency, and duration, as well as providing additional benefits. The NMC have fostered better use of existing CSS facilities to store and convey combined sewage, and they have given heightened priority to the elimination of dry weather overflows. They have also made CSO communities more attentive to pollution prevention and floatables control. In addition, they have informed the public about the presence and dangers of CSOs through posting and other measures. There are, however, a number of challenges remaining related to the NMC centered on documenting implementation and effectiveness.

The NMC have made CSO communities more attentive to pollution prevention and floatables control through activities such as street sweeping and catch basin cleaning.

Photo: EPA

The CSO Control Policy acknowledged the necessity to document the actions to be taken by CSO permittees to implement the NMC and to report on the effectiveness of the NMC in reducing or eliminating CSO impacts. It expected CSO communities to implement the NMC with appropriate documentation by January 1, 1997. Based on data collected for this report, initial documentation of NMC implementation was generally found in NPDES permit files. However, there was limited documentation related to on-going implementation of NMC activities. Documentation is needed to confirm continued implementation of selected controls, particularly in instances where there are delays in LTCP development.

The CSO Control Policy also recommended documentation by CSO permittees to assess the effectiveness of the NMC in reducing and/or eliminating water quality impacts, and monitoring to characterize CSO impacts and efficacy of CSO controls. Generally, CSO permittees were found not to be reporting these data as part of documentation submitted to the NPDES authorities. In most cases, CSO permits only require one-time documentation of the NMC. Only a few NPDES authorities require annual reporting on implementation of the NMC. Further, as described in Section 5.8 of this report, although several NPDES authorities require regular reporting on the volume and frequency of CSO events, no data management protocols exist for tracking the results across time.

CSO controls can be costly to implement. Construction of the 7.2 mgd storage tunnel in Richmond, VA cost more than $29 million. The tunnel is one component of a three-phased program.

Photo: Richmond Department of Public Works

LTCP

As described in Chapter 6 and as demonstrated in the case studies presented in Appendix C, a number of CSO communities have developed successful LTCPs and are achieving environmental benefits through implementation. While many communities are just beginning to implement or have yet to implement LTCPs, there is reason to believe that the LTCP process is sound. Communities with advanced LTCP programs like New York City, Columbus, Georgia, and San Francisco are realizing the CWA objectives anticipated in the CSO Control Policy. Beach and shellfish bed openings and attainment of water quality standards have been observed and recorded. Priority has been given to the control of CSOs in sensitive areas. The CSO communities that are less advanced in LTCP implementation appear to be using similar planning processes and CSO controls, and can be expected to achieve similar results in the future.

Many CSO communities find that achieving water quality standards in urban waters is complicated by other sources of pollution including storm water and other nonpoint sources. In particular, some communities find that complete control of CSOs does not always lead to attainment of water quality standards. Further, without a TMDL it is difficult to identify an equitable level of CSO control. In fact, this dilemma of full control without attaining water quality standards causes some CSO communities to question the value of initiating any CSO controls. This uncertainty has resulted in delays on the part of CSO communities to commit to development and implementation of LTCPs.

The clear levels of control needed to meet water quality standards are often not defined. Some municipalities are uncertain as to how to approach the complexities related to controlling CSOs, particularly in trying to balance infrastructure investments and other competing regulatory requirements.

Evaluation of the LTCP concept (i.e., does it provide clear levels of control for CSOs and ensure compliance with CWA requirements) is difficult because many CSO communities are still in the process of developing

LTCPs. Although only about a third of CSO permittees have drafted LTCPs, data were collected and reviewed to assess the use of two approaches (presumption and demonstration) provided in the CSO Control Policy to meet the water quality-based provisions of the CWA.

Use of explicit performance criteria such as those included in the CSO Control Policy presumption approach has helped communities design LTCPs. Other CSO communities have not used the presumption approach due to the concern that any CSO will cause or at least contribute to non-attainment (see related discussion in Section 6.5.3). This is particularly the case when CSOs discharge to impaired waters (i.e., discharge to waters listed under CWA section 303(d) as not achieving applicable water quality standards).

A number of CSO permittees have decided to follow the demonstration approach for their LTCPs. In general, following a demonstration approach provides CSO communities with more assurance that when completed and implemented, LTCPs will result in attainment of applicable water quality standards.

Some CSO communities have proposed a combination of presumption and demonstration approaches, for different receiving waters.

Monitoring data to ascertain the effectiveness of the presumption, demonstration or combined approach for controlling CSOs to meet the water quality-based provisions of the CWA were not available for review for this report. Data for this analysis will become available as post-construction compliance monitoring programs are initiated.

Finally, as described in Section 6.3.2 of this report, a number of CSO controls were identified in the LTCPs reviewed for this report. Sewer separation (a form of collection system control) was the CSO control used most widely by CSO communities. EPA believes that sewer separation, if found to be feasible in light of site-specific constraints, was often selected because it alleviates concerns related to attainment of water quality standards for CSOs. It also reflects that certain states (e.g., Vermont) have encouraged sewer separation as the preferred control for CSOs. Many municipalities choose site-specific separation in service areas that are mostly served by separate sewers and where migrating the remaining connections from the CSS to the separate system is feasible.

7.2.2 Provide Sufficient Flexibility to Municipalities to Consider the Site-Specific Nature of CSOs

The CSO Control Policy expected that CSO permittees would:

> *...undertake a process to accurately characterize their sewer systems, to demonstrate implementation of the nine minimum controls, and to develop a long-term control plan...consider innovative and alternative approaches and technologies that achieve the objectives of this Policy and the CWA.*

Sewer separation tunnel installed by New Brunswick, NJ. Sewer separation is the most common long-term control used by CSO permittees.

Photo: NJ Department of Environmental Protection

The CSO Control Policy also advocated that selected approaches and technologies be designed to:

> *...allow cost effective expansion or cost effective retrofitting if additional controls are subsequently determined to be necessary to meet WQS, including existing and designated uses.*

This section discusses the impact the flexibility has had on implementation.

Flexibility Provided by Permitting Authorities in Implementing the CSO Control Policy

As described in Chapter 2, in response to the National CSO Control Strategy, states were requested to develop CSO permitting strategies to bring all wet weather CSOs into compliance with the requirements of the CWA. States submitted and received approval of state-wide permitting strategies. As described in Section 5.2, some states have adjusted the permitting strategies to accommodate the provisions contained in the CSO Control Policy. In other cases, states were found to continue to assert state priorities related to water quality protection programs, and some states were found to operate on a project-specific basis.

Overall, EPA noted variability in how the CSO Control Policy was implemented and enforced among the states that regulate CSOs. Some of the variability noted by EPA stems from the flexibility in the CSO Control Policy, which has led to differences in the approaches used by states to implement the NPDES permit and water quality standards programs. For example, permit conditions for CSOs, like any other point source discharger in California, are based on basin plans. New York uses an Environmental Benefits Priority System to identify those permits whose reissuance would provide the greatest environmental benefit. New Jersey issues permits, including those for CSOs, on a watershed basis. Some of the variability noted is also based on the relative importance placed on CSOs as compared to other discharges within a state. This was particularly noted by several states in light of the pressures to reduce NPDES permit backlogs. In those states that contain a small number of CSOs, EPA found that the CSO Control Policy provisions were primarily implemented on a CSO permittee-specific basis.

EPA also found that although most states require technology-based requirements similar to the NMC, certain states decided to require controls different than the NMC, or emphasized the use of one or more particular control. For example, New York requires CSO permittees to implement 15 specific BMPs to control CSOs which are essentially equivalent to the NMC. New Jersey initially emphasized the control of solids and floatables to aesthetically improve waters, and is now focusing on use of disinfection to minimize human health impacts.

Variability was also noticed among state requirements to develop and implement LTCPs. Some of this variability was based on the decision in several states to develop a preferred state-wide approach to specifically address CSOs. For example, Vermont has advocated the use of sewer separation as the means to control CSOs. Michigan requires all CSO permittees develop controls to meet a design storm based presumption approach. Massachusetts uses a watershed-based approach to prioritize CSO controls along with other critical environmental needs.

Generally, the more prescriptive a state was in terms of preferred approaches to CSO control, the more advanced program implementation was in controlling CSOs. In part, this may be due to the fact that state-wide approaches provide definitive targets for CSO permittees (e.g., the non-negotiable approach used by Michigan that requires either elimination of the CSO or adequate CSO treatment in accordance with specified design requirements). Alternatively, some CSO communities perceive the flexibility provided to NPDES authorities in the CSO Control Policy has not been extended to the communities, particularly in those states with very prescriptive state-wide approaches. Similarly, the flexibility in the process for reviewing and revising state water quality standards is perceived to be unevenly applied (see related discussion regarding water quality standards in Section 7.2.4 below).

Consideration of Cost-Effectiveness of CSO Control Options

The CSO Control Policy encourages municipalities, NPDES and water quality standards authorities, and the public to work together to develop cost-effective CSO controls that meet water quality standards. The CSO Control Policy states that cost/performance evaluations should:

> *...include an analysis to determine where the increment of pollution reduction achieved in the receiving water diminishes compared to the increased costs...(this analysis) should be among the considerations used to help guide selection of controls.*

As described in the *EPA Guidance for Long Term Control Plan* (EPA,1995f), these analyses typically involve estimating costs for a range of control levels, then comparing performance versus cost and identifying the point of diminishing returns, referred to as the "knee-of-the-curve." The EPA guidance also recommends that CSO permittees consider non-monetary factors (e.g., environmental issues and impacts, technical issues, and implementation issues) that can influence the selection of CSO control alternatives.

According to the *1996 EPA Clean Water Needs Survey* (EPA, 1997b), costs for all CSO control projects were estimated to be $44.7 billion (in 1996 dollars). As discussed in Section 6.4.4 of this report, incremental increases in levels of CSO controls considered may result in significant increases in total project costs. While it appears knee-of-the-curve analysis is being conducted and considered in developing LTCP control recommendations, it is only one element considered in selectingCSO control options.

Other Issues Related to Flexibility in Implementation of the CSO Control Policy

Although the CSO Control Policy provides and promotes flexibility in controlling CSOs, the flexibility is limited to CSO control. Many CSO permittees are municipalities that are also responsible for compliance with other NPDES permit program requirements such as effluent limitations for discharges from the POTW (including secondary treatment standards and applicable water quality-based effluent limitations), management of biosolids, implementation of a pretreatment program, and control of discharges from municipal separate storm sewer systems. In addition, there are a number of other programs, such as the TMDL program for impaired receiving waters, that may impact the stringency of controls that must be implemented for point source discharges from municipal operations. EPA is also considering proposing revisions to the NPDES permit regulations to improve the operation of municipal sanitary sewer collection systems and reduce the frequency and occurrence of sanitary sewer overflows.

Other than encouraging the evaluation of proposed CSO control needs on a watershed basis, the CSO Control Policy does not discuss flexibility as it relates to interaction and overlap in related NPDES regulatory programs and requirements (i.e., there is no flexibility afforded to CSO communities to balance other NPDES program requirements with those based on the CSO Control Policy).

However, there are some examples of CSO communities that have successfully worked with the NPDES authority to balance NPDES program requirements. For example, the Louisville & Jefferson County Metropolitan Sewer District has taken the initiative to work with the State of Kentucky to combine NPDES program requirements so that monitoring can be coordinated and implemented on a watershed basis. Coordination of programmatic requirements has not only resulted in more effective monitoring to assess receiving water impacts (e.g., monitoring CSO, storm water, and POTW discharges to the same receiving water body at the same time), but has assisted in prioritizing and focusing future municipal expenditures.

7.2.3 Allowing a Phased Approach to Implementation of CSO Controls

The CSO Control Policy described a phased approach in permitting to implement the CSO Control Policy. Phase I permits were to be designed to at least require immediate implementation and subsequent documentation of the NMC, and development and submittal of an LTCP generally within two years after the effective date of the permit (unless a longer schedule is determined to be needed). Phase II permits were to require continued implementation of the NMC, implementation of the LTCP including the selected controls necessary to meet CWA requirements, and implementation of the approved post-construction compliance monitoring program.

In general, the phasing concept of the CSO Control Policy has been followed. Most CSO communities were initially required through a NPDES permit or other type of enforceable mechanism to implement the NMC and then develop an LTCP.

Use of Enforceable Mechanisms to Implement CSO Control Requirements

Development and implementation of LTCPs by CSO communities was required through an enforcement action in some instances (e.g., administrative order). Enforcement actions are used in some cases to accommodate the fact that NPDES permits are limited in the way compliance schedules may be incorporated. If an LTCP for a CSO community includes significant structural controls (e.g., expanding POTW capacity) that will take longer to complete than allowed by the state standards (e.g., water quality standards do not allow for the issuance of a compliance schedule as part of an NPDES permit), then an enforcement order is necessary to establish a schedule for implementation. If the schedule is for more than five years, then a judicial enforcement order is necessary. In these cases, a judicial enforcement order is the only means to establish a legally binding schedule for implementation. Finally, an enforcement action may be taken as a result of non-compliance on the part of a CSO permittee.

Role of Financial Capability and Effect of CSO Financing on Phased Implementation

Financial capability is one of six factors listed in the CSO Control Policy for consideration when developing a schedule for implementation of CSO controls. Financial capability may justify a longer-term phased approach to implementation of LTCPs and implementation schedules.

According to the *EPA Guidance on Financial Capability Assessment and Schedule Development* (EPA, 1997e), the financial capability determinations and characterization of a municipality's financial capability to implement CSO controls can be based on a number of measures. General scheduling boundaries provided in the financial capability guidance are presented in Table 7.1 below.

EPA found that CSO communities do perform a financial capability assessment and factor the results of the assessment into the implementation schedule included as part of the LTCP. In some cases, the length of the proposed schedule for completion of selected CSO controls may be related to the effect of the length of time provided for amortization of CSO-related capital investments.

EPA also found that NPDES authorities do follow the EPA guidance and negotiate implementation schedules. However, there is little in the way of documentation to describe how financial capability has been used in development and approval of CSO controls or LTCPs.

As discussed in Chapter 6 and based on the fact that many CSO communities have yet to develop an LTCP, it is expected that significant municipal expenditures to control CSOs will be required, and that issues related to the financial capability of municipalities to finance CSO controls are likely to become more important. The impact of future CSO control expenditures and financial capability will intensify financial impacts on municipalities as they continue to deal with degrading infrastructure and other needs. It is expected that municipal residents with lower incomes may be faced with sharp increases in sewer rates. Sizeable populations within CSO communities often already bear significant cost-burdens.

The *1996 Clean Water Needs Survey* estimated capital costs for all CSO control projects to be $44.7 billion. Based in part on the potentially significant resources required to develop and implement CSO controls, a variety of federal and state funding programs have been made available to assist CSO communities. As described in Chapters 4 and 5, states mainly use the SRF to fund CSO control projects ($2.08 billion during the period 1989-2000). SRF loans for CSO projects in 2000 were the highest ever, accounting for $411 million (12 percent of total SRF assistance). State-specific loan and grant programs also exist, but offer limited funding (generally available for use in covering planning and program development versus implementation costs).

7.2.4 Review and Revise, as Appropriate, Water Quality Standards When Developing CSO Control Plans

As described in Chapter 2, the CSO Control Policy encouraged a comprehensive and coordinated planning effort to control CSOs and achieve applicable water quality standards. The purpose of this coordination was to ensure that any CSO controls identified in the LTCP would be coordinated with the review and revision, as appropriate, of applicable water quality standards. Coordination would assist in ensuring that proper data are provided to allow for review and revision, as appropriate, of the applicability of water quality standards. This section discusses how coordination with state water quality standards has occurred as a result of the CSO Control Policy.

Table 7.1

Implementation Schedule Based on Financial Capability

EPA has issued guidance for NPDES authorities on how to relate community financial capability to proposed implementation schedules. EPA found that authorities follow the guidance, but do not document their activities well.

Financial Capability Category	Implementation Period
Low burden	Normal engineering/construction schedule
Medium burden	Up to 10 years
High burden	Up to 15 years

Review and revision as necessary of water quality standards within the context of the CSO Control Policy were rarely documented. There may be a number of reasons that impede the review process:

- The water quality standards regulations at 40 CFR Part 131 acknowledge there may be instances where modifications to or variances from applicable water quality standards may be justified to acknowledge site-specific conditions of the discharge and receiving water. However, revisions to water quality standards are generally not encouraged. This is particularly true as it relates to downgrading designated uses, which requires a UAA that can be resource intensive. Some types of revisions are completely prohibited; for example, the removal of an "existing" use, defined as a use that was being attained in 1975. In addition, there are a few states that, as a matter of practice, will not accept requests for modifications of water quality standards.

- The data and information to support changes to designated uses and associated water quality standards can be collected most cost-effectively as part of the development of an LTCP, which can be an expensive process.

- There is uncertainty on the part of communities about the process for the review and revision, as appropriate, of state water quality standards. There has been a need for guidance identifying explicit data requirements to support water quality standards review for CSO receiving waters. EPA published guidance concerning the coordination of CSO controls and water quality standards in August 2001.

As described in Section 5.6.1, a few states have developed specific procedures for considering the applicability of water quality standards for CSO receiving waters. However, most states have not specifically accommodated water quality standards reviews for CSOs (i.e., they do not provide a specific method to address changes to designated uses, variances, or adjustment to water quality criteria for CSO-impacted water bodies as part of the LTCP process). Rather, most states address the review of water quality standards for CSOs during a state-wide or watershed based triennial review. States have limited resources and competing priorities for water quality standards reviews, particularly for waters with court-ordered TMDLs. Therefore, the state may be unable to accommodate a specific review request.

EPA believes that greater levels of coordination are needed among all entities to support the development of CSO control to meet appropriate water quality standards and the review and revision of these standards as appropriate. This requires a more intensive effort where permitting and water quality standard activities are in different organizational units.

Although three states have procedures for considering the applicability of water quality standards for CSO receiving waters, only MWRA, the sanitary authority serving Boston, has received CSO-related standards revision.

Photo: Photodisc

Water quality standards reviews must include sufficient data to support designated use changes, site-specific criteria development, and/or variance requests. Often the data are not available to properly evaluate modification requests. In these cases, the state, the CSO permittee, or both, would bear the responsibility to generate an appropriate data set to allow for a determination. If coordination is not occurring with all interested stakeholders, then additional resources may be needed to address issues raised by these other stakeholders.

EPA now recommends the use of *E.coli* or enterococci for freshwaters and enterococci for marine waters because epidemiological studies show that *E.coli* and enterococci are better indicators of gastrointestinal illness than fecal coliform. EPA recommends the geometric mean of the samples taken to not exceed the criterion and the single sample maximum to be met for a water body to fully support its primary contact recreation use. Future state decisions to adopt new indicator bacteria will have implications for CSO LTCPs designed based on existing water quality standards.

7.3 Accomplishments Attributable to Implementation and Enforcement of the CSO Control Policy

EPA believes that implementation of the CSO Control Policy by EPA regions, states, and CSO communities since 1994 has reduced loadings and benefitted the environment.

7.3.1 National Estimates of CSO Volume and Pollutant Loading Reductions

As described in Chapter 4, EPA has initiated efforts to track and report on GPRA performance measures, and has developed a national model to estimate pollutant and flow reductions attributable to implementation of CSO controls by communities. For purposes of this report, the GPRACSO model was used to provide some preliminary estimates of the nationwide CSO reductions based on various CSO management scenarios. A brief summary of the GPRACSO model and how the model was used to derive estimates for this report is presented in Appendix S. Overall, the GPRACSO model attempts to evaluate how CSS management has evolved over a 10-year period. EPA applied the GPRACSO model to obtain a basic understanding of CSS management, simplifying as necessary to obtain system-wide estimates of overflow for each CSS.

For purposes of this report, the GPRACSO model was applied to evaluate CSO volume and BOD pollutant loadings associated with four scenarios:

- Baseline scenario—representing CSO volumes and pollutant loadings prior to issuance of the CSO Control Policy.
- Low-end current implementation scenario—representing estimates of CSO volumes and pollutant loadings after implementation of the CSO Control Policy. This scenario represents conservative, low-end estimates of management measures that are currently in-place.
- High-end current implementation scenario—representing less-conservative, higher-end estimates of implementation of management measures to reduce CSO volumes and pollutant loadings.
- Future expected implementation scenario—representing a best-case future scenario of CSO volume and pollutant load reductions assuming full implementation of CSO controls.

As shown in Table 7.2, the GPRACSO model predicts that approximately 1.46 trillion gallons per year of CSOs occurred prior to issuance of the CSO Control Policy, and over 1 billion pounds per year of BOD were discharged from CSOs. Currently, EPA estimates untreated CSO volumes range from 1.26 to 1.29 trillion gallons per year, and BOD loadings range from 915 to 930 million pounds per year. The GPRACSO model predicts that there has been between a 12 percent and 14 percent reduction nationwide of untreated CSO volume and BOD loadings, respectively, since issuance of the CSO Control Policy in 1994.

Assuming full implementation of the CSO Control Policy, approximately 1.3 trillion gallons per year of CSOs would be treated nationally, and approximately 600 million pounds per year of BOD would be removed from discharges from CSOs. As shown in Table 7.2, this will require communities with CSSs to provide advanced primary treatment to an estimated additional one trillion gallons, or 35 percent more volume, than is currently receiving this minimum level of treatment.

It should be noted that EPA has attempted to be conservative when estimating reductions in overflows and pollutant loadings. As described above, only structural CSO controls, such as improved POTW operations, were considered (i.e., non-structural controls such as enhanced pretreatment requirements and downspout disconnect programs are not recognized). It should also be noted that GPRACSO model results

Table 7.2

Pollutant Reduction Estimates Based on Implementation of CSO Control Policy

EPA's GPRACSO model was used to evaluate the potential reduction to CSO volume based both on current implementation and future expected implementation.

Scenario	Annual Untreated CSO Volume (Trillion Gallons/Year)	Dry/Wet Weather Volume Treated (Trillion Gallons/Year)	Annual BOD Discharged (Million Pounds/Year)
Baseline	1.46	2.80	1,070
Low-End Current Implementation	1.29	2.97	930
High-End Current Implementation	1.26	3.00	915
Future Expected Implementation	0.20	4.06	480

sometimes indicated CSO volumes and loadings actually increased over the baseline condition. This occurs wherever the service population or acreage has increased, while POTW treatment capacity has remained constant (i.e., the dry weather sanitary flows have increased, leaving less capacity to treat wet weather flows).

7.3.2 Accomplishments Attributable to Implementation and Enforcement of the CSO Control Policy

The focus of the second Report to Congress in 2003 will be the extent of human health and environmental impacts caused by CSOs and SSOs. Although not the focus of this report, this section describes some of the accomplishments related to the control of CSOs brought about by the CSO Control Policy.

As described in Chapter 4, EPA does not yet possess a data management system that tracks reductions in CSO frequency, duration or volume, or improvements in water quality. However, based on data collected for this report, EPA observed a number of accomplishments attributable to implementation of the CSO Control Policy. Many of these achievements have directly contributed to reductions in CSOs and protection of receiving water quality. Accomplishments include:

- Stimulating implementation of effective CSO controls—As described throughout Chapter 6, implementation and enforcement of the CSO Control Policy has stimulated many CSO communities to take actions to control CSOs. Some of these activities, such as floatables controls, have directly resulted in improving the aesthetics and recreation of receiving waters. Other activities, such as increasing capacity at POTWs to treat greater volumes wet weather flows, have resulted in flow and load reductions, and in a few cases, notable improvements to water quality and protection of human health have been documented.

- Reducing dry weather overflows—As described in Section 6.2.1, particular importance (both from a permitting and compliance and enforcement basis) was placed on CSO permittees to eliminate dry weather overflows. This focus is important from a human health and environmental protection standpoint, as dry weather overflows occur at times when receiving waters are less able to accommodate pollutant loadings (as compared to when higher flow conditions occur as a result of wet weather). Data indicate that most CSO communities have eliminated chronic dry weather overflows, and have inspections programs designed to detect and eliminate other occasional dry weather overflows when they occur.

- Protecting sensitive areas - As described in Chapter 2, the CSO Control Policy expects that CSO permittees give highest priority to controlling CSOs to sensitive areas. Section 6.3.3 indicates that more than 30 percent of the CSO files reviewed noted CSO discharges to sensitive areas. As a result, a number of CSO permittees have prioritized and implemented specific programs and initiatives to address discharges to sensitive areas.

- Raising public awareness - A major component of the CSO Control Policy was to ensure that all stakeholders were aware of the potential human health and environmental problems associated with CSOs, as well as the types of controls available to reduce the volume, frequency and duration of CSOs. Raising the awareness of all stakeholders assists in ensuring that CSO control options will be protective of human health and the environment, as well as securing resource commitments for developing and implementing CSO controls.

7.4 Next Steps

As described throughout this report, significant efforts have been made at all levels to implement and enforce the CSO Control Policy. However, more work remains to ensure that human health and the environment are adequately protected from CSOs. Slower progress than expected in the development and implementation of LTCPs continues for several reasons. Chief among them are delays in the issuance of permits requiring CSO controls, delays in the issuance of guidance, and delays in LTCP approval. In addition, there is a reluctance on the part of CSO communities to commit resources due to actual or perceived uncertainties related to definitive compliance endpoints for CSO control.

EPA expects NPDES authorities, state water quality standards authorities, and CSO communities to actively participate in the implementation and enforcement of the CSO Control Policy. EPA realizes the importance of its role to lead future activities that will ensure continued progress is made in controlling CSOs. Based on the findings from this report, there are a number of activities EPA will pursue in the future:

Ensure that All CSOs Are Appropriately Controlled

- Implement the "shall conform" statutory mandate.
    - Begin efforts to implement new CWA Section 402(q)(1), which requires that future permits or other enforceable mechanisms for CSOs conform to the CSO Control Policy. These efforts will include evaluating the need for regulatory amendments, policy statements or other appropriate actions to ensure implementation of CSO programs consistent with the CSO Control Policy.

Ensure All CSOs Are Appropriately Regulated

- Follow up with NPDES authorities to ensure that CSO permits or other enforceable mechanisms are issued as soon as possible for those CSO communities that have not yet been required to control CSOs. EPA will also work with the states to ensure that permits and enforcement actions (e.g. orders, decrees) are consistent with the CSO Control Policy, as required by new CWA Section 402(q)(1). EPA will issue guidance on this topic.

Improve Implementation of the CSO Control Policy

- Advocate CSO control on a watershed basis.
  - Continue efforts to focus protection of water quality on a watershed approach and support development of CSO LTCPs on a watershed basis. EPA will also continue efforts to encourage integration of wet weather programs, including support in facilitating the wet weather pilot projects grant program as described in an amendment to Title I of the CWA.
- Work with states to speed the water quality standards review and revision process.
  - Continue to work with states, communities, and constituency groups on coordinating the review and revision of water quality standards with development of LTCPs. EPA will establish a tracking system for water quality standards reviews on CSO-receiving waters. EPA will also assess the need for additional guidance and tools to facilitate the water quality standards review process for all sources, including CSO.
- Strengthen CSO information management.
  - Work to coordinate information management activities and strengthen performance measurement such that data generated by CSO communities can be collected and managed to demonstrate the environmental outcomes of CSO control.
- Improve compliance assistance and enforcement.
  - CSOs will continue to be a national compliance and enforcement priority in fiscal years 2002 and 2003. EPA will work closely with NPDES authorities and states to target enforcement actions, where appropriate, to ensure compliance with the CSO requirements in NPDES permits or other enforceable mechanisms. In addition, EPA will develop and promote compliance assistance tools.
- Improve EPA and state oversight.
  - Review and strengthen existing practices and procedures used by EPA and states to ensure CSO controls are being implemented. This review will include evaluation of reporting requirements to demonstrate ongoing implementation of the NMC, as well as examination of procedures used to ensure proper communication and coordination during review

and revision of water quality standards and implementation procedures.

Initiate Efforts for the Second Report to Congress in 2003.

- Initiate efforts to define the scope and methodology for the second Report to Congress due in December 2003. In the second report EPA is required to summarize the extent of human health and environmental impacts caused by CSOs and SSOs, report on the resources spent by CSO communities to address these impacts, and evaluate the technologies used, including whether sewer separation is environmentally preferred for all situations. EPA will build on CSO data collected for this report and develop a methodology for addressing the challenges of collecting and analyzing SSO data.

SEC. 112. WET WEATHER WATER QUALITY. (a) COMBINED SEWER OVERFLOWS.—Section 402 of the Federal Water Pollution Control Act (33 U.S.C. 1342) is amended by adding at the end the following:

''(q) COMBINED SEWER OVERFLOWS.—

''(1) REQUIREMENT FOR PERMITS, ORDERS, AND DECREES.—Each permit, order, or decree issued pursuant to this Act after the date of enactment of this subsection for a discharge from a municipal combined storm and sanitary sewer shall conform to the Combined Sewer Overflow Control Policy signed by the Administrator on April 11, 1994 (in this subsection referred to as the 'CSO control policy').

''(2) WATER QUALITY AND DESIGNATED USE REVIEW GUIDANCE.—Not later than July 31, 2001, and after providing notice and opportunity for public comment, the Administrator shall issue guidance to facilitate the conduct of water quality and designated use reviews for municipal combined sewer overflow receiving waters.

''(3) REPORT.—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.''.

(b) WET WEATHER PILOT PROGRAM.—Title I of the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.) is amended by adding at the end the following:

''SEC. 121. WET WEATHER WATERSHED PILOT PROJECTS.

''(a) IN GENERAL.—The Administrator, in coordination with the States, may provide technical assistance and grants for treatment works to carry out pilot projects relating to the following areas of wet weather discharge control:

''(1) WATERSHED MANAGEMENT OF WET WEATHER DISCHARGES.—The management of municipal combined sewer overflows, sanitary sewer overflows, and stormwater discharges, on an integrated watershed or subwatershed basis for the purpose of demonstrating the effectiveness of a unified wet weather approach.

''(2) STORMWATER BEST MANAGEMENT PRACTICES.—The control of pollutants from municipal separate storm sewer systems for the purpose of demonstrating and determining controls that are cost-effective and that use innovative technologies in reducing such pollutants from stormwater discharges.

''(b) ADMINISTRATION.—The Administrator, in coordination with the States, shall provide municipalities participating in a pilot project under this section the ability to engage in innovative practices, including the ability to unify separate wet weather control efforts under a single permit.

''(c) FUNDING.—

''(1) IN GENERAL.—There is authorized to be appropriated to carry out this section $10,000,000 for fiscal year 2002, $15,000,000 for fiscal year 2003, and $20,000,000 for fiscal year 2004. Such funds shall remain available until expended.

''(2) STORMWATER.—The Administrator shall make available not less than 20 percent of amounts appropriated for a fiscal year pursuant to this subsection to carry out the purposes of subsection (a)(2).

''(3) ADMINISTRATIVE EXPENSES.—The Administrator may retain not to exceed 4 percent of any amounts appropriated for a fiscal year pursuant to this subsection for the reasonable and necessary costs of administering this section.

''(d) REPORT TO CONGRESS.—Not later than 5 years after the date of enactment of this section, the Administrator shall transmit to Congress a report on the results of the pilot projects conducted under this section and their possible application nationwide.''.

(c) SEWER OVERFLOW CONTROL GRANTS.—Title II of the Federal Water Pollution Control Act (33 U.S.C. 1342 et seq.) is amended by adding at the end the following:

''SEC. 221. SEWER OVERFLOW CONTROL GRANTS.

''(a) IN GENERAL.—In any fiscal year in which the Administrator has available for obligation at least $1,350,000,000 for the purposes of section 601—

''(1) the Administrator may make grants to States for the purpose of providing grants to a municipality or municipal entity for planning, design, and construction of treatment works to intercept, transport, control, or treat municipal combined sewer overflows and sanitary sewer overflows; and

''(2) subject to subsection (g), the Administrator may make a direct grant to a municipality or municipal entity for the purposes described in paragraph (1).

''(b) PRIORITIZATION.—In selecting from among municipalities applying for grants under subsection (a), a State or the Administrator shall give priority to an applicant that—

''(1) is a municipality that is a financially distressed community under subsection (c);

''(2) has implemented or is complying with an implementation schedule for the 9 minimum controls specified in the CSO control policy referred to in section 402(q)(1) and has begun implementing a long-term municipal combined sewer overflow control plan or a separate sanitary sewer overflow control plan; or

''(3) is requesting a grant for a project that is on a State's intended use plan pursuant to section 606(c); or

''(4) is an Alaska Native Village.

''(c) FINANCIALLY DISTRESSED COMMUNITY.—

''(1) DEFINITION.—In subsection (b), the term 'financially distressed community' means a community that meets affordability criteria established by the State in which the community is located, if such criteria are developed after public review and comment.

''(2) CONSIDERATION OF IMPACT ON WATER AND SEWER RATES.—In determining if a community is a distressed community for the purposes of subsection (b), the State shall consider, among other factors, the extent to which the rate of growth of a community's tax base has been historically slow such that implementing a plan described in subsection (b)(2) would result in a significant increase in any water or sewer rate charged by the community's publicly owned wastewater treatment facility.

''(3) INFORMATION TO ASSIST STATES.—The Administrator may publish information to assist States in establishing affordability criteria under paragraph (1).

''(d) COST SHARING.—The Federal share of the cost of activities carried out using amounts from a grant made under subsection (a) shall be not less than 55 percent of the cost. The non-Federal share of the cost may include, in any amount, public and private funds and in-kind services, and may include, notwithstanding section 603(h), financial assistance, including loans, from a State water pollution control revolving fund.

''(e) ADMINISTRATIVE REPORTING REQUIREMENTS.—If a project receives grant assistance under subsection (a) and loan assistance from a State water pollution control revolving fund and the loan assistance is for 15 percent or more of the cost of the project, the project may be administered in accordance with State water pollution control revolving fund administrative reporting requirements for the purposes of streamlining such requirements.

''(f) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this section $750,000,000 for each of fiscal years 2002 and 2003. Such sums shall remain available until expended.

''(g) ALLOCATION OF FUNDS.—

''(1) FISCAL YEAR 2002.—Subject to subsection (h), the Administrator shall use the amounts appropriated to carry out this section for fiscal year 2002 for making grants to municipalities and municipal entities under subsection (a)(2), in accordance with the criteria set forth in subsection (b).

''(2) FISCAL YEAR 2003.—Subject to subsection (h), the Administrator shall use the amounts appropriated to carry out this section for fiscal year 2003 as follows:

''(A) Not to exceed $250,000,000 for making grants to municipalities and municipal entities under subsection (a)(2), in accordance with the criteria set forth in subsection (b).

''(B) All remaining amounts for making grants to States under subsection (a)(1), in accordance with a formula to be established by the Administrator, after providing notice and an opportunity for public comment, that allocates to each State a proportional share of such amounts based on the total needs of the State for municipal combined sewer overflow controls and sanitary sewer overflow controls identified in the most recent survey conducted pursuant to section 516(b)(1).

''(h) ADMINISTRATIVE EXPENSES.—Of the amounts appropriated to carry out this section for each fiscal year—

''(1) the Administrator may retain an amount not to exceed 1 percent for the reasonable and necessary costs of administering this section; and

''(2) the Administrator, or a State, may retain an amount not to exceed 4 percent of any grant made to a municipality or municipal entity under subsection (a), for the reasonable and necessary costs of administering the grant.

''(i) REPORTS.—Not later than December 31, 2003, and periodically thereafter, the Administrator shall transmit to Congress a report containing recommended funding levels for grants under this section. The recommended funding levels shall be sufficient to ensure the continued expeditious implementation of municipal combined sewer overflow and sanitary sewer overflow controls nationwide.''.

(d) INFORMATION ON CSOS AND SSOS.—

(1) REPORT TO CONGRESS.—Not later than 3 years after the date of enactment of this Act, the Administrator of the Environmental Protection Agency shall transmit to Congress a report summarizing—

(A) the extent of the human health and environmental impacts caused by municipal combined sewer overflows and sanitary sewer overflows, including the location of discharges causing such impacts, the volume of pollutants discharged, and the constituents discharged;

(B) the resources spent by municipalities to address these impacts; and

(C) an evaluation of the technologies used by municipalities to address these impacts.

(2) TECHNOLOGY CLEARINGHOUSE.—After transmitting a report under paragraph (1), the Administrator shall maintain a clearinghouse of cost-effective and efficient technologies for addressing human health and environmental impacts due to municipal combined sewer overflows and sanitary sewer overflows.

Appendix B

Profiles of State CSO Programs

CSO Permits

5

Permitted CSO Outfalls

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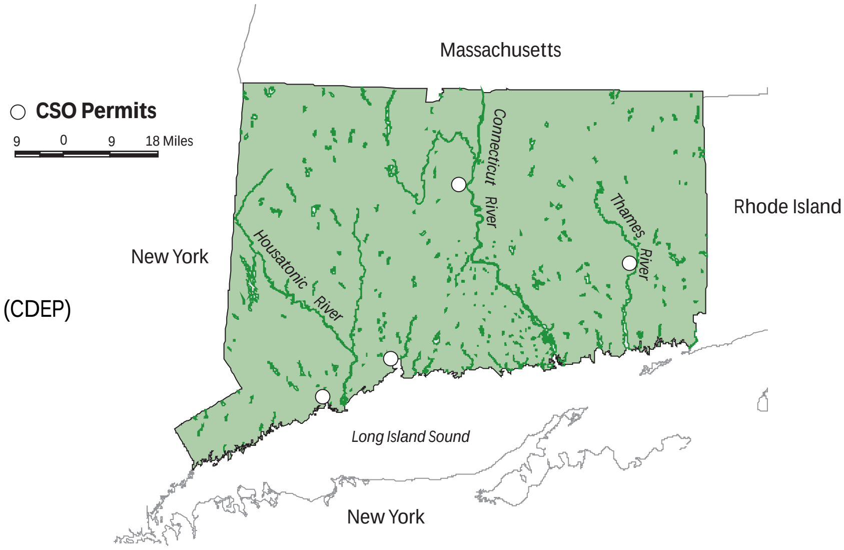
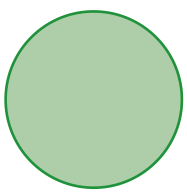
NPDES/Water Quality Standards Authority

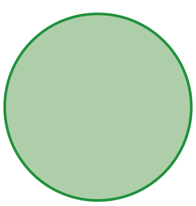
Connecticut Department of Environmental Protection (CDEP)

Online Resources

http://dep.state.ct.us/index.htm
http://dep.state.ct.us/wtr/index.htm







Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	5	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**5**	**100%**
Facility Plan Requirements		
LTCP	5	100%
Other Facility Plan	0	0%
No Facility Plan	0	0%
Total	**5**	**100%**

Program Highlights

- Connecticut has encouraged sewer separation.
- All CSO communities have done at least some sewer separation.
- NMC and LTCP were not required where complete separation was underway.
- CDEP's initial CSS assessments identified 14 CSO permittees; there are currently five CSO permittees.

State Profile

Maine—Region 1

CSO Permits

44

Permitted CSO Outfalls

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NPDES Authority

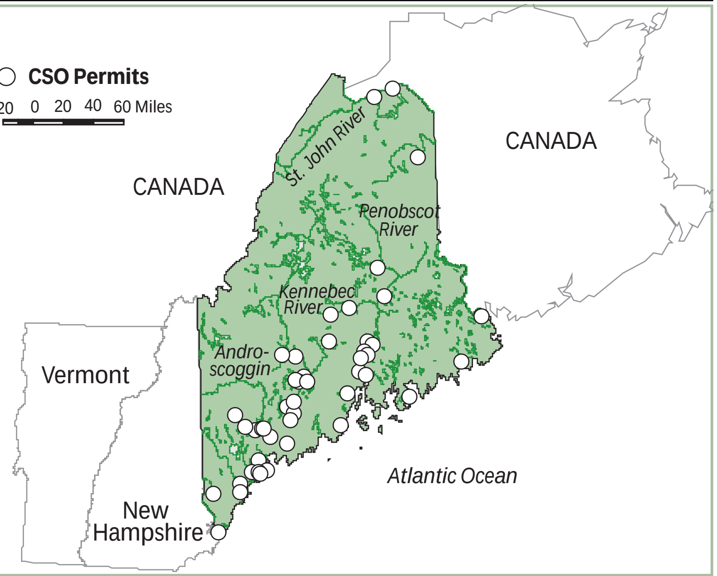
EPA Region 1 (through December 2000)
Maine Department of Environmental Protection (MDEP)
(as of January 2001)

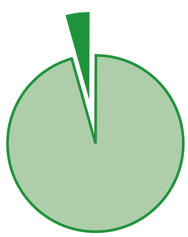
Water Quality Standards Authority

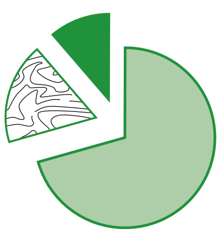
MDEP

Online Resources

http://janus.state.me.us/dep/blwq/







Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	42	95.5%
Some BMPs	0	0%
No BMPs	2	4.5%
Total	**44**	**100%**
Facility Plan Requirements		
LTCP	31	70.4%
Other Facility Plan	8	18.2%
No Facility Plan	5	11.4%
Total	**44**	**100%**

Program Highlights

- Nearly all Maine communities have focused CSO abatement efforts on transporting wet weather flows to the WWTP for treatment, sewer separation, or some combination thereof.
- 42 communities are required (in permits) to implement NMC (two of the 44 CSO permittees are not required to implement NMC); all have complied. Of these, 34 are required to implement LTCPs: 30 of those required have submitted LTCP documentation to the state, and 26 LTCPs have been approved.
- Changes to Maine's water quality standards and designated uses were made in 1995 to allow CSO communities to request temporary CSO subcategories, which may suspend designated uses for short periods following wet weather events.
- Maine has provided grants (for 25 percent of funding needs) to assist municipalities in completing CSO Master Plans.
- Initial CSS assessments of the state identified 60 CSO permittees; there are currently 44 CSO permittees.

Strategy for CSO Control and NPDES Permitting

MDEP first issued Program Guidance on Combined Sewer Overflow Control Plans in January 1990, which outlined components of effective CSO programs. The guidance encouraged communities to convey wet weather flows to the WWTP for primary treatment and disinfection. In 1994, MDEP released *Program Guidance on Combined Sewer Overflow Facility Plans*, which includes information on developing monitoring plans, implementing best management practices, and selecting controls when developing a CSO Master Plan. The concepts discussed in this document are similar to those outlined in EPA's 1994 CSO Control Policy. Maine has also provided grants (for 25 percent of funding needs) to assist municipalities in completing its CSO Master Plans. Plans submitted to the state since 1990 show that nearly all Maine communities have focused abatement efforts on sewer separation, transporting wet weather flows to the WWTP for treatment, or some combination thereof. Sixteen communities in Maine completed separation of its combined sewers prior to the CSO Control Policy.

Permitting Program

Prior to January 2001, EPA's Region 1 office served as the NPDES authority for the State of Maine. Maine issued state waste discharge licenses to any discharger receiving an NPDES permit from the EPA Region with similar terms.

Permits issued since 1994 have generally conformed with the CSO Control Policy. All of the 42 Maine communities with permit requirements to implement the NMC have complied. Of these, 34 communities also have enforceable requirements to develop LTCPs. The eight, out of the 42, communities without LTCP requirements are typically small communities and are actively implementing sewer separation. Currently, 30 communities with requirements to develop LTCPs have submitted plans to the state, and the state has approved 26 plans. To date, 21 of the 60 communities in Maine, identified in the pre-1994 assessment of the state, have fully controlled its CSOs, and another 18 are working to implement approved control plans.

Water Quality Standards Program

Following a two-year stakeholder process, changes to Maine's water quality standards and designated uses were made in 1995 to allow CSO communities to request temporary CSO subcategories. The site-specific CSO subcategories will remove designated uses for short periods of time (determined on a site-specific basis) after rain storms and snow melt in areas affected by existing CSOs. The application of the subcategories is determined based on modeling and monitoring data developed by the community. This change allows communities to continue to make progress in controlling CSOs without undue financial hardship and to meet State water quality standards. Maine received a grant from EPA in 2001 to pilot test the application of the temporary CSO subcategories in select communities.

Enforcement Program

Most ongoing enforcement actions within the State of Maine have been initiated by EPA Region 1's Water Enforcement Program. EPA Region 1 currently has nine CSO-related enforcement actions in Maine. The majority of these focus on CSO Master Plan implementation schedules that exceed five years. Maine also has its own enforcement authority; it has initiated three CSO-related consent decrees to communities failing to comply with the terms of their license.

CSO Permits

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Permitted CSO Outfalls

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NPDES Authority

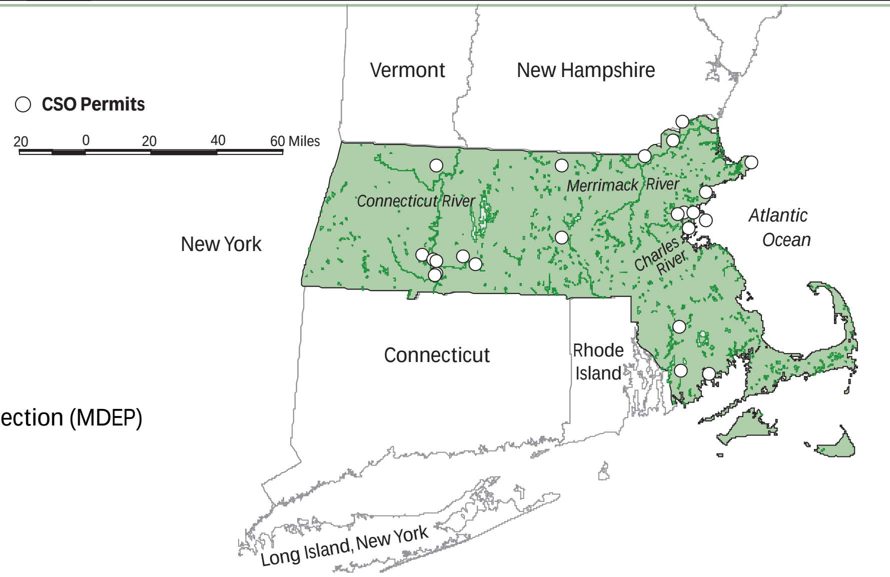
EPA Region 1

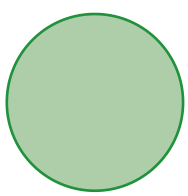
Water Quality Standards Authority

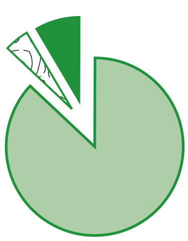
Massachusetts Department of Environmental Protection (MDEP)

Online Resources

www.state.ma.us/dep/dephome.htm







Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	23	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**23**	**100%**
Facility Plan Requirements		
LTCP	20	87.0%
Other Facility Plan	1	4.3%
No Facility Plan	2	8.7%
Total	**23**	**100%**

Strategy for CSO Control and NPDES Permitting

The primary approach in Massachusetts has been the use of the NPDES permitting process to initiate CSO planning and to follow up with combined enforcement and compliance assistance efforts to help communities initiate projects and develop program milestones and schedules. Communities are required to implement less-costly controls (i.e., NMC) as an initial means to abate CSOs. For those requiring more long-term solutions, the community must develop a phased approach for identifying and implementing control solutions. The community is encouraged (through the LTCP process) to use technologies that maximize environmental benefits. Elimination of CSOs is preferred; where elimination of CSOs is determined to be infeasible, a protocol has been developed for considering alternate class/designations, variances, and partial use designations. The long-term planning efforts are formalized in administrative orders, consent decrees, or other enforceable mechanisms. This approach was formalized in MDEP State CSO Control Policy.

Program Highlights

- Massachusetts' CSO Program is coordinated through EPA Region 1 and MDEP.
- NMC are required in all CSO permits.
- 21 communities have LTCP requirements in their enforcement orders, 15 communities have submitted LTCPs, and 10 communities have had LTCPs approved.
- Massachusetts developed a watershed-based approach for CSO control planning and a protocol for UAA that reflects CSOs.
- Massachusetts developed an approach for water quality standards and redesignations.
- Initial CSS assessments of the state identified 26 CSO permittees; there are currently 23 CSO permittees.

Massachusetts was the first State to initiate a watershed-based approach to prioritize CSO controls along with other critical environmental needs. Massachusetts also is one of the three states that has established use category designations for CSO-impacted waters. In addition, it has identified a UAA process for communities that believe achieving levels set in the State standards is not feasible or appropriate for a specific water body.

Permitting Program

EPA Region 1's NPDES Permit Task Force issues wastewater discharge permits for Massachusetts. CSO communities are typically issued Phase I NPDES permits that require implementation and documentation of the NMC, containing a special CSO section that the CSO community meet water quality standards or equivalent. The CSO section also includes a narrative requirement. Therefore, if the CSO community implements the NMC and cannot effectively eliminate the CSOs, the permittee is in violation of the permit. EPA Region 1 and MDEP are now in the process of developing Phase II CSO permits which will establish effluent limits for those communities that have completed their LTCP planning process.

Water Quality Standards Program

MDEP establishes and reviews water quality standards. DEP developed the State CSO policy, which in turn led to the formal protocol for classifying and evaluating CSO-impacted waters. MDEP's CSO policy and water quality standards approach serve as the basis for CSO permitting and enforcement activities conducted by EPA Region 1.

MDEP developed a hierarchical list of surface water classifications to regulate CSO discharges where CSO elimination was determined to be infeasible, based on the frequency and impact of each overflow. The regulatory options for CSOs include:

- Class B—indicates that CSO discharges have been eliminated.
- Class B(CSO)— a partial use designation indicating that elimination of all CSO discharges is not feasible and that the impacts from the remaining CSOs will be minor.

A designation of Class B(CSO) is made only if MDEP community planning process and watershed planning efforts demonstrate that the allowance of minor CSO discharges is the most environmentally protective and cost-effective option available. In general, MDEP does not consider the Class B(CSO) designation to be a significant downgrading of water quality, but believes that current water quality standards would be met most of the time, and that the CSO impacts from the minor discharges are at a level comparable with the water quality goals. Furthermore, this designation is only allowed in "non-critical resource areas." Critical areas would include beaches, shellfish habitats, drinking water intakes, endangered species habitats, etc.

Specifically, MDEP's CSO control policy allows Class B(CSO) designations for discharges that can meet water quality standards more than 95 percent of the time (equivalent to control of untreated CSO discharge up to a three-month frequency storm; each event assumed to last a period of four days). The highest achievable/affordable control to meet this level of standards must be identified and implemented through the LTCP process. A UAA must be developed for communities to document that achieving a higher level of CSO control is not feasible or appropriate.

MDEP also allows for variances and partial use designation for CSO-impacted waters. Variances allow for short-term modifications of Massachusetts water quality standards when interim control measures or further analyses are warranted. Thus, variances allow communities to comply with temporary water quality standards in their NPDES permits while progress is being made to comply with the existing standards. Variances are issued by MDEP and can be both discharger- and pollutant-specific, and are time-limited; they do not change the current water body class designation (e.g., Class B). MDEP grants partial use designations (based on results from a UAA) in CSO-impacted waters, where MDEP is certain that the designated uses or standards cannot and will not be attained on a permanent basis. Partial use generally indicates a short-term impairment of uses and can be defined by seasons or a particular storm event when a use such as primary public recreation contact and bathing will be unattainable in CSO-impacted waters. The use must be fully protected downstream, in other seasons, or during smaller storm events.

In areas where MDEP determines that designated uses cannot and will not be met on a permanent basis, MDEP will then consider a change in classification from Class B to Class C (a downgrading of water quality). This option is a last resort and must be based on UAA findings that the designated use cannot be reasonably attained.

To date, MDEP has listed portions of Boston Harbor as Class B(CSO) and has approved variances for the CSO-impacted areas of the Charles and Mystic Rivers.

Enforcement Program

EPA Region 1's Water Enforcement Program is responsible for conducting compliance monitoring and enforcement activities. Region 1's Office of Ecosystem Protection (OEP) issues NPDES permits. Most CSO communities are under a Consent Degree or an Administrative Order in Massachusetts. EPA Region 1 requires (in permit) that the CSO community must meet water quality standards. If this cannot be achieved through the NMC required in the permit, the community is in a noncompliance situation. Region 1 then intervenes and works with the community to develop an approach and a schedule for initiating and developing a LTCP. This is formalized in an enforceable schedule within an Administrative Order and then reaffirmed during reissuance in the Permit Fact Sheet developed by OEP.

CSO Permits

5

Permitted CSO Outfalls

44

NPDES Authority

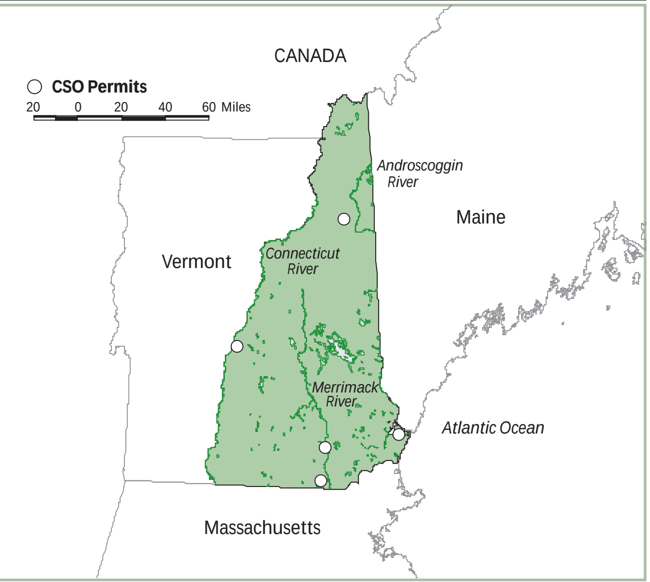
EPA Region 1

Water Quality Standards Authority

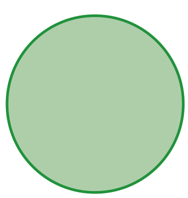
New Hampshire Department of Environmental Services (NHDES)

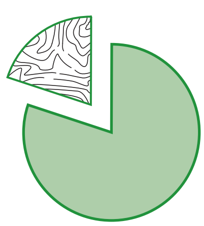
Online Resources

www.des.state.nh.us/water_intro.htm
www.des.state.nh.us/factsheets/wwt/web-9.htm



Status of CSO Policy Requirements





Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	5	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**5**	**100%**
Facility Plan Requirements		
LTCP	4	80%
Other Facility Plan	1	20%
No Facility Plan	0	0%
Total	**5**	**100%**

Program Highlights

- EPA Region 1 and NHDES coordinate New Hampshire's CSO program.
- NMC are required in all CSO permits.
- Enforcement and compliance assistance lead the development and schedule for long-term CSO planning efforts.
- New Hampshire developed an approach for water quality standards evaluation and redesignations.
- Initial CSS assessments of the state identified six CSO permittees; there are currently five CSO permittees (Berlin, Nashua, Portsmouth, Lebanon, and Manchester).

Strategy for CSO Control and NPDES Permitting

EPA Region 1's approach in New Hampshire has primarily relied upon the use of the NPDES permitting process to initiate CSO planning and follow-up. Combined enforcement and assistance efforts have been used to help communities initiate projects, develop program milestones, and establish schedules. Communities are encouraged to implement less costly, nonstructural controls (i.e., NMC) as a means to abate its CSOs. For those requiring more long-term solutions, the community must develop a phased approach for identifying and implementing control solutions, encouraging the use of technologies that maximize environmental benefits (through the LTCP process). The long-term planning efforts are formalized in administrative orders, consent decrees, or other enforceable mechanisms. In 1987 EPA Region 1 developed an NPDES Policy for Control of CSOs that was used to address all of the CSOs in the state.

Permitting Program

EPA Region 1's NPDES Permit Task Force issues wastewater discharge permits for New Hampshire. CSO communities are typically issued NPDES permits that require implementation and documentation of the NMC for control of CSOs outlined in a special CSO section. In this section, the permit also requires in a narrative statement that the CSO community must meet water quality standards or equivalent. Therefore, if the CSO community implements its NMC and cannot effectively eliminate its CSOs, the CSO community is in violation of its permit.

Water Quality Standards Program

The NHDES establishes and reviews state water quality standards. The state's 1989 CSO control strategy outlines the two step-process:

- Determine the volume and strength of CSO discharges and its impact on the water quality of the receiving waters.
- Where it is determined that CSOs violate New Hampshire's Surface Water Quality Regulations (N.H. Administrative Rules, Env-Ws 1700), the community must then develop a comprehensive CSO Facility Plan (i.e., LTCP) to determine the most cost-effective solution to abate CSO pollution.

New Hampshire has also developed a surface water partial-use designation called Temporary Partial Use (TPU) or Class B (TPU). A designation of Class B(TPU) is made only if the community planning process and watershed planning efforts demonstrate that the allowance of minor CSO discharges is the most environmentally protective and cost-effective option available. In general, NHDES does not consider the Class B(TPU) designation to be a significant downgrading of water quality, but believes that current water quality standards would be met most of the time and that the impacts from the CSO discharges would be at a level comparable with the water quality goals. Furthermore, this designation is only allowed in "non-critical resource areas." Critical areas would include beaches, shellfish habitats, drinking water intakes, and endangered species habitats.

Enforcement Program

EPA Region 1's Water Enforcement Program is responsible for conducting compliance monitoring and enforcement activities in New Hampshire. Region 1's Office of Ecosystem Protection (OEP) issues NPDES permits. Most CSO communities are under a Consent Degree or an Executive or Administrative Order in New Hampshire. EPA Region 1 requires (in permit) that the CSO community must meet water quality standards. If this cannot be achieved through the NMC (required in the permit), the community is in a noncompliance situation. EPA Region 1 intervenes and works with the community to develop an approach and schedule for initiating and developing an LTCP. This is formalized in a schedule within an Administrative Order. The schedule is then reaffirmed during permit reissuance in the Permit Fact Sheet developed by OEP.

State Profile — Rhode Island—Region 1

CSO Permits

3

Permitted CSO Outfalls

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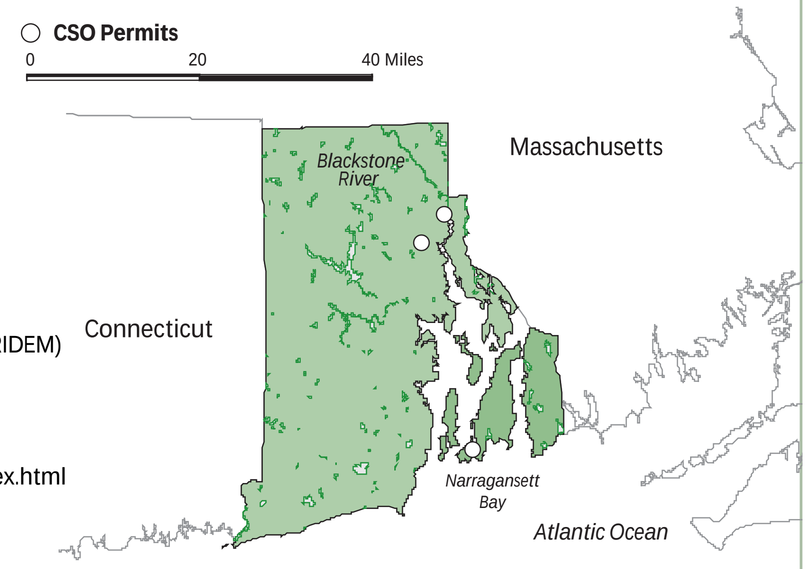
NPDES/Water Quality Standards Authority

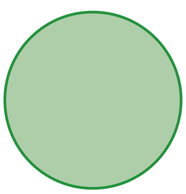
Rhode Island Department of Environmental Management (RIDEM)

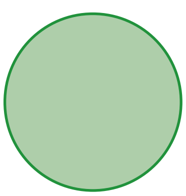
Online Resources

www.state.ri.us/dem/
www.state.ri.us/dem/programs/benviron/water/quality/index.html



Status of CSO Policy Requirements





Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	3	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**3**	**100%**
Facility Plan Requirements		
LTCP	3	100%
Other Facility Plan	0	0%
No Facility Plan	0	0%
Total	**3**	**100%**

Program Highlights

- Rhode Island's 1990 CSO policy requires primary treatment or equivalent for all CSO discharges; higher levels of treatment are required when necessary to meet water quality standards.
- A stakeholder-based LTCP was developed by the Narragansett Bay Commission. A three-phase abatement plan has been approved that limits CSO events to four per year. The primary control is deep rock tunnel storage and pump-back for treatment. The final design of Phase I has been approved (except for pump station and instrumentation and controls).
- Newport has built two CSO abatement facilities, but the older facility does not comply with state or federal CSO policy. RIDEM is requiring further planning to assess the need for additional controls at both facilities.

State Profile Vermont—Region 1

CSO Permits

7

Permitted CSO Outfalls

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NPDES Authority

Vermont Department of Environmental Conservation (VDEC)

Water Quality Standards Authority

Vermont Water Resources Board (VWRB)

State Online Resources

www.state.vt.us/wtrboard/

Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	0	0%
Some BMPs	7	100%
No BMPs	0	0%
Total	**7**	**100%**
Facility Plan Requirements		
LTCP	0	0%
Other Facility Plan	7	100%
No Facility Plan	0	0%
Total	**7**	**100%**

Program Highlights

- All CSO requirements have been handled through administrative orders.
- Vermont provided up to 50 percent of the total cost for CSO correction projects through state grants and interest free loans.
- Initial CSS assessment by VDEC identified 27 CSO permittees. 20 of these communities have separated their systems, leaving seven CSO permittees.

Strategy for CSO Control and NPDES Permitting

VDEC published a state Combined Sewer Overflow Control Policy in1990. The state CSO policy included a listing of Vermont's CSO communities and outlined a strategy for CSO compliance. The strategy required communities to identify all overflow structures within their collection systems as part of the permit application process. Once the overflows were identified, VDEC determined which outfalls were subject to the guidelines of the state CSO policy.

CSO outfalls that were not in compliance with Vermont water quality standards and federal minimum technology-based limitations were issued an administrative order outlining a compliance schedule. Administrative orders were generally issued immediately following issuance of the community's NPDES permit. The state CSO policy encouraged complete elimination of CSOs (e.g., sewer separation) when other CSO control alternatives were determined to be technically and economically equal.

Communities that opted for CSO separation were required to be able to capture and provide full treatment for a minimum design flow generated by a 24 hour, 2.5-inch rainfall. Vermont provided funding up to 50 percent of the total cost for CSO correction projects through state grants and interest free loans. The majority of communities in Vermont (20 out of 27) chose sewer separation as their primary method for CSO control.

Permitting Program

Vermont's NPDES permits do not require CSO communities to implement the NMC. However, communities that receive approval from VDEC to continue to operate CSO outfalls are required by the state CSO policy to implement a series of BMPs as part of their CSO corrective plan. The BMPs required by VDEC are similar to a subset of the NMC and include:

- Solids and floatables control
- Proper operation and maintenance of the collection system
- Maximum use of collection system storage
- Maximization of flows to the wastewater treatment facility

Approximately 40 percent of the CSO communities in Vermont were required in either their permits or administrative orders to implement a combination of the state BMPs as part of their CSO control plan. Vermont did not require CSO communities to submit a formal document for their LTCP. Instead, communities were required under administrative orders to submit a preliminary engineering report that outlined their CSO correction plans and funding needs. Following submission of each engineering report, VDEC adjusted statements in the community's administrative order regarding the compliance schedule, based on project needs and funding availability.

Water Quality Standards Program

VDEC is responsible for determining if approved CSO discharges are in compliance with water quality standards. Disinfection is required for all CSO discharges under the state CSO policy. VDEC may require additional in-stream monitoring, either through the community's permit or administrative order, to ensure attainment of water quality standards. Over 30 percent of the communities were required to develop a monitoring program. Under the state CSO policy, communities are required to eliminate all CSOs that discharge to Class B waters. Vermont does not have a specific procedure for the reclassification of CSO receiving waters. Communities that determine complete CSO elimination to be unattainable can follow the standard state procedure and petition VWRB to reclassify the receiving water. The majority of communities in the state achieved compliance with state water quality standards by eliminating all CSO outfalls through sewer separation.

Enforcement Program

Vermont required implementation of CSO controls through state-issued administrative orders. Communities that did not meet the requirements set in the administrative order were issued a consent order. Only four communities in Vermont received a state-issued consent order for violation of administrative orders. Approximately 74 percent of the communities in the state have completed construction on their CSO control projects. During the next permit cycle, VDEC plans to review the effectiveness of each community's CSO control plan. If the community continues to be in violation of the state CSO policy, VDEC will issue another administrative order outlining any additional requirements and compliance schedules the community must meet. To date, only one community has been issued a second administrative order, because its sewer separation project did not completely eliminate all CSO discharges for the required design flow.

State Profile New Jersey—Region 2

CSO Permits

31

Permitted CSO Outfalls

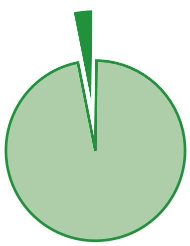
274

NPDES Authority/Water Quality Standards Authority

New Jersey Department of Environmental Protection (NJDEP)

Online Resources

http:/www.state.nj.us/dep/
http://www.state.nj.us/dep/dwq/



Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	30	96.8%
Some BMPs	0	0%
No BMPs	1	3.2%
Total	**31**	**100%**
Facility Plan Requirements		
LTCP	0	0%
Other Facility Plan	4	12.9%
No Facility Plan	27	87.1%
Total	**31**	**100%**

Program Highlights

- New Jersey has highly regionalized collection, conveyance, and treatment systems with portions of the CSSs owned/operated by different local government entities.
- The CSO program is administered using a combination of individual and general NPDES permits.
- NJDEP provides substantial funding for the planning, design, and construction of CSO control facilities and for infrastructure rehabilitation and improvement.
- LTCP development is incorporated into the ongoing state-wide watershed management and TMDL process in accordance with the TMDL development schedule contained in a Memorandum of Understanding with EPA Region 2.
- NJDEP has adopted and is implementing a comprehensive solids and floatables control requirement, supported with state financial assistance.

Strategy for CSO Control and NPDES Permitting

New Jersey has highly regionalized collection, conveyance, and treatment systems with portions of the sewer systems owned/operated by different local government entities. The wastewater treatment facilities generally serve multiple local governments. Collection systems and corresponding CSO points are generally owned/operated by municipalities, while conveyance and treatment facilities are owned/operated by independent treatment authorities; however some utility authorities do own/operate CSOs.

The CSO program is administered using a combination of individual and general NPDES permits. The program requires CSO communities that own or operate any portion of a CSS to develop and implement technology-based control measures, including the NMC. These enforceable commitments also initiate the first phase of LTCP planning activities by requiring development of calibrated and field-verified SWMM models of the CSS.

NJDEP has adopted a far-reaching solids and floatables control requirement that has resulted in reductions to the size of areas served by CSSs and the number of CSO outfalls. CSO communities are required to capture, remove, and properly dispose of all solids and floatables materials from all CSOs on an enforceable compliance schedule.

Under the New Jersey Sewerage Infrastructure Improvement Act (SIIA, enacted in 1988), NJDEP initiated a program that provides planning and design grants for the development and implementation of solids/floatables control measures and for the identification and elimination of dry weather overflows. Grants are awarded for implementation of control measures that capture and remove solids/floatables materials from CSO discharges and that remediate or modify the CSS to eliminate dry weather overflows. Most often, "in-line" or "end-of-pipe" screen technologies have been selected. New Jersey estimates that $340 million will be spent for the planning, design, and construction of solids and floatables control measures. LTCP development is incorporated into the ongoing statewide watershed management and TMDL process, in accordance with the TMDL development schedule contained in a Memorandum of Understanding with EPA Region 2.

NJDEP uses the SRF Program to assist in the construction of CSO control facilities and infrastructure rehabilitation and improvement.

Permitting Program

NJDEP serves as the NPDES authority. The CSO program is administered using a combination of individual and general permits. The general permit contains regulatory requirements applicable to collection and conveyance systems and CSOs. Approximately 16 local government entities and approximately 231 CSOs are regulated under the general permit. The general permit contains appropriate provisions of the NMC applicable to owners/operators of collection and conveyance systems and CSOs, including:

- Prohibition of dry weather overflows
- Solids/floatables control
- Development and implementation of proper operation and regular maintenance programs
- Maximization of flow to the WWTP
- Public notification/reporting requirements

The general permit also initiates LTCP development, by requiring the development of calibrated and field-verified SWMM models of the CSS

Regulatory requirements applicable to wastewater treatment systems are generally contained in individual NPDES permits. Each wastewater treatment facility and any CSOs owned by the treatment authority are regulated under an individual permit issued to the treatment facility. Individual NPDES permits issued to wastewater treatment authorities contain appropriate provisions of the NMC applicable to owners/operators of WWTPs, including:

- Maximization of conveyance and treatment of wastewater at the WWTP
- Minimization of nondomestic discharges (during wet weather)
- Development and implementation of proper operation and regular maintenance programs

If the treatment authority also owns or operates CSOs, then the permit contains provisions similar to those in the general permit.

Water Quality Standards Program

The water quality standards program is also administered by NJDEP. NJDEP is using a watershed process to develop watershed restoration plans. During the watershed process, water quality standards and uses will be considered as NJDEP develops management responses that may include TMDLs, LTCPs and other appropriate activities. CSO communities have not yet formally approached NJDEP to request the initiation of changes to the surface water quality standards.

Enforcement Program

NJDEP uses a range of enforcement actions to implement CSO controls and has initiated numerous enforcement actions against communities determined to be out of compliance with the CSO provisions of their NPDES permits. NJDEP has entered into judicial consent orders in state superior court with five CSO communities, including one that was the result of a citizen's suit, and has entered into administrative consent orders with six CSO communities. In addition, NJDEP has filed complaints in state superior court against two CSO communities that are in noncompliance with their NPDES permits, and is currently developing administrative consent orders with four additional local government entities.

CSO Permits

74

Permitted CSO Outfalls

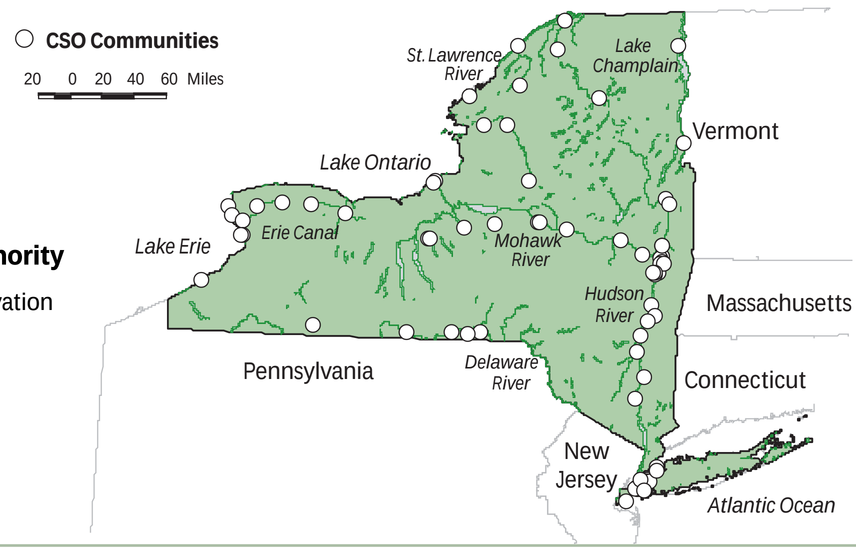
1,098

NPDES Authority/Water Quality Standards Authority

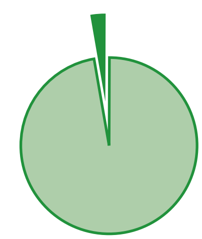
New York State Department of Environmental Conservation (NYSDEC)

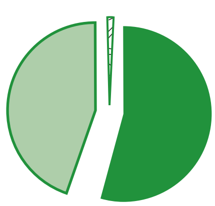
Online Resources

www.dec.state.ny.us/
www.dec.state.ny.us/website/dow/index.html



Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	72	97.3%
Some BMPs	0	0%
No BMPs	2	2.7%
Total	**74**	**100%**
Facility Plan Requirements		
LTCP	33	44.6%
Other Facility Plan	1	1.4%
No Facility Plan	40	54.1%
Total	**74**	**100%**





Program Highlights

- 33 of the 74 New York CSO communities are required to develop LTCPs. These LTCPs cover 71 percent of the CSO outfalls in the state.
- NYDEC developed a set of 15 BMPs, which it asserts are equivalent to eight of the NMC. The ninth, "pollution prevention" is addressed through several alternate BMPs designed to minimize pollution.
- The suite of applicable BMPs for each community is determined on a site-specific basis..
- NYDEC implemented its Environmental Benefits Permit Strategy to identify permits whose reissuance would provide the greatest environmental benefit.
- NYDEC is participating in New York City's Use and Standards Attainment (USA) Project to assess highest reasonably attainable use for its CSO-impacted waters.
- Initial CSS assessments identified 90 CSO permittees; there are currently 74 permits.

Strategy for CSO Control and NPDES Permitting

NYSDEC first issued its Combined Sewer Overflow Control Strategy (the Strategy) in October 1993. The Strategy provided guidance to NYSDEC staff on developing NPDES permit conditions, compliance, and enforcement strategies, surveillance, and technical reviews to address the abatement of CSO impacts. The goal of the Strategy was the elimination of all CSO-related water quality impairments, and it gave special emphasis to controlling floatable materials. The Strategy also recognized that the state's CSO problems and abatement needs were dominated by the major metropolitan areas: New York City, Buffalo, and Syracuse.

Twelve BMPs designed to minimize the water quality impacts of CSOs were outlined in the Strategy. Six of the BMPs were equivalent to the six minimum measures required by the CSO Control Strategy. NYSDEC has since added three BMP measures, such that the set of 15 BMPs cover activities and actions described by eight of the NMC. The ninth, "pollution prevention", is addressed through several alternate BMPs designed to minimize pollution. The 15 BMPs are:

- Development of a CSO maintenance and inspection program.
- Optimization of the collection system to maximize in-system storage.
- Consideration of CSOs in approved industrial pretreatment programs.
- Maximization of flow to WWTPs.
- Development and implementation of a wet weather operating plan.
- Prohibition of dry weather overflows.
- Elimination or minimization of floatable and settleable solids in discharges.
- Replacement of combined sewers with separate sewers to the greatest extent possible.
- Prohibition on introduction of new sources of storm water.
- Prohibition of new connections in areas with recurring sewage back-ups.
- Prohibition of the discharge or release of septage or hauled waste upstream of a CSO.
- Implementation of practices and technologies to control runoff from new development.
- Installation and maintenance of signs at CSO outfalls.
- Characterization and monitoring of the CSS.
- Submission of annual reports summarizing BMP implementation.

Applicability of the 15 BMPs is determined on a site-specific basis, but 72 of 74 New York CSO communities currently have permit requirements to implement at least one of the BMPs.

Permitting Program

NYSDEC issued its Environmental Benefit Permit Strategy (EBPS) in September 1992. The EBPS established a process for prioritizing reissuance of permits based on the environmental benefits that would be gained, rather than reviewing permits in chronological order. NYSDEC's goal is to revise the top 10 percent of the state-issued NPDES permits on the priority ranking list each year. This equates to approximately 60 NPDES POTW permits per year.

Under the EBPS, each permit receives a numerical score for each of 15 factors as they apply to that particular permit. The two factors relevant to CSO control are permit requirements to implement the 15 BMPs, and permit requirements to develop and submit an LTCP. Each factor is then multiplied by a "water quality enhancement multiplier" (which ranges from 1–10) that describes the benefit of modifying the permit to address the factor.

In response to an EPA Office of the Inspector General audit survey, NYSDEC reviewed all of the NPDES permits with CSOs and elevated the priority of any permits that have deficiencies with respect to CSO controls. As a result, most of the permits for CSO communities will be reviewed within the next three years. Currently 33 of New York's 74 CSO communities have permit requirements to develop LTCPs; these 33 LTCPs cover 71 percent, of the state's 1,098 CSO outfalls.

Water Quality Standards Program

Only New York City has approached the state to request a review of water quality standards for its CSO-impacted waters. New York City initiated a use and standards attainment (USA) project to assess the highest reasonably attainable use for its CSO-impacted waters. NYSDEC also anticipates that Buffalo and Syracuse may have an interest in standards reviews, but they have not yet initiated a formal process with NYSDEC.

The goals of the New York City USA Project are as follows:

- Define, through a public process, more specific and comprehensive long-term beneficial use goals for each water body, including habitat, recreational, wetlands and riparian goals, in addition to water quality goals, thus maximizing the overall environmental benefit.
- Develop technical, economic, public, and regulatory support for prioritizing and expediting implementation of projects and actions needed to attain the defined goals.
- Provide the technical, scientific, and economic basis to support the regulatory process needed to define water quality standards for the highest reasonably attainable use to allow water quality standards to be attained upon implementation of recommended projects.

Enforcement Program

NYDEC uses both NPDES permits and enforceable orders to require implementation of minimum measures and LTCP requirements in CSO communities. This has resulted in a high rate of compliance with state submittal schedules and implementation progress.

NYDEC issued permits to New York City on September 27, 1988, requiring that CSO abatement be addressed by a series of Facility Planning Programs. Facility plans were to be developed for nine area-specific segments: Flushing Bay, Paerdegat Basin, Jamaica Bay, East River, Inner Harbor, Outer Harbor, Coney Island Creek, Newtown Creek, and the Jamaica Drainage Area tributaries. New York City failed to start and/or complete facility plans by the specified date for the Inner Harbor, Outer Harbor, East River, and the Jamaica Bay Tributaries. As a result of these violations, DEC and New York City signed an Order of Consent dated June 25, 1992. The order established a 14-year compliance schedule to plan, design, and construct CSO abatement (storage) facilities which will prevent violations of dissolved oxygen and coliform permit limits. Although significant progress has been made, New York City is not in compliance with some of the requirements of this order.

The Amended Consent Judgement for Onondaga County (Syracuse) requires the implementation of an LTCP designed to meet the presumption approach with a commitment to spend approximately $145-$150 million on CSO controls. Binghamton-Johnson City is under a consent order to implement an LTCP to meet the presumption approach.

In addition, a number of CSO communities in New York are under enforcement orders related to violations at their WWTPs. These violations can often be traced to the wet weather impacts that the CSS is having on the operation of its treatment facility.

State Profile

Delaware—Region 3

CSO Permits

2

Permitted CSO Outfalls

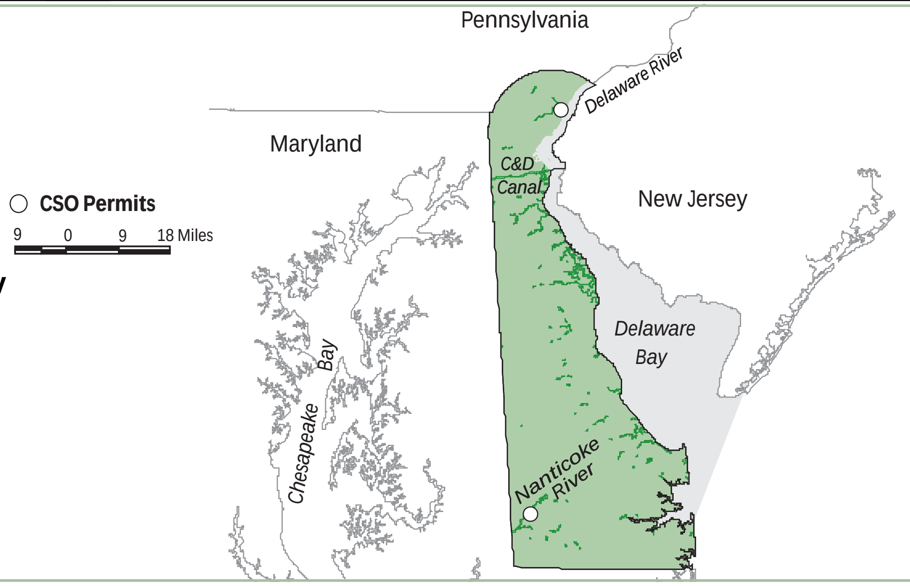
39

NPDES/Water Quality Standards Authority

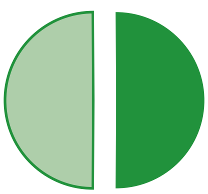
Delaware Department of Natural Resources and Environmental Control (DNREC)

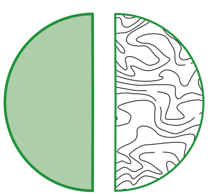
Online Resources

www.dnrec.state.de.us/dnrec2000/



Status of CSO Policy Requirements





Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	1	50%
Some BMPs	0	0%
No BMPs	1	50%
Total	**2**	**100%**
Facility Plan Requirements		
LTCP	1	50%
Other Facility Plan	1	50%
No Facility Plan	0	0%
Total	**2**	**100%**

Strategy for CSO Control and NPDES Permitting

Delaware currently has two CSO communities. The Division of Water Resources within the DNREC is responsible for administering the NPDES program. The Division developed its CSO Strategy in 1991, prior to the adoption of EPA's CSO Control Policy. Because of the small number of CSO communities, the Division chose to address each CSO community on a case-by-case basis, incorporating the appropriate permit conditions to address each community's CSOs as its NPDES permit came up for renewal.

Program Highlights

- Delaware has two CSO permittees: Seaford and Wilmington.
- Seaford has been working to separate its eight CSOs through sewer separation. Work has progressed as funding becomes available. One CSO was eliminated prior to the development of the community's CSO control plan in 1994. Two CSOs were eliminated in 1996, one in 1997, and three in 2000. Separation of the one remaining CSO is expected to be completed by 2003.
- The NPDES permit for Seaford was reissued with an effective date of September 1, 2000. An extension for the reissued permit requires elimination of all CSOs within 30 months of the permit's effective date (i.e., no later than January 31, 2003).
- Wilmington has drafted an LTCP that outlines a strategy combining underground storage, pump station upgrades, and sewer separation to minimize the number of overflows and provide treatment for 85 percent of the combined flow reaching the sewer system.

State Profile Washington, District of Columbia—Region 3

CSO Permits

1

Permitted CSO Outfalls

60

NPDES Authority

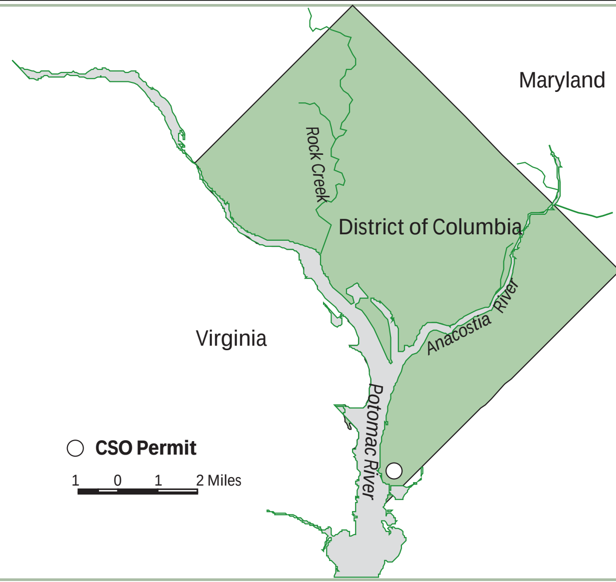
EPA Region 3

Water Quality Standards Authority

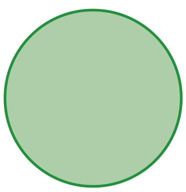
District of Columbia Department of Health (DCDOH)

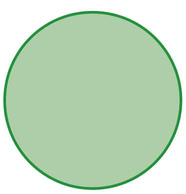
Online Resources

www.environ.state.dc.us
www.epa.gov/reg3wapd/cso/index.htm



Status of CSO Policy Requirements





Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	1	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**1**	**100%**
Facility Plan Requirements		
LTCP	1	100%
Other Facility Plan	0	0%
No Facility Plan	0	0%
Total	**1**	**100%**

Program Highlights

- The District of Columbia Water and Sewer Authority (WASA) is the sole CSO permittee.
- EPA Region 3, as the NPDES authority, requires NMC documentation and LTCP submission.
- DCDOH reviews and comments on the LTCP, determines compliance with water quality standards, and serves on the CSO stakeholder committee.

Strategy for CSO Control and NPDES Permitting

Approximately one-third of the District of Columbia is served by a CSS. The community has implemented the NMC and is in the process of developing its LTCP. The proposed CSO Control Program includes three storage tunnels, pump station rehabilitation, regulator improvements, and low impact development retrofits. There are a total of 60 CSO outfalls listed in the District of Columbia's NPDES Permit that discharge to Rock Creek, the Anacostia River, the Potomac River and tributary waters.

Permitting Program

EPA Region 3 is the NPDES authority for the District of Columbia. Documentation of the NMC was submitted to EPA Region 3 in 1996, with follow-up reports in 1999 and 2000. WASA began developing its LTCP in 1998, and submitted a draft LTCP to EPA Region 3 and DCDOH in June 2001.

Through the review of the LTCP and water quality certification process, DCDOH exercises regulatory authority. DCDOH has submitted to EPA a final TMDL for BOD in the Anacostia River that includes an allocation for CSOs.

Water Quality Standards Program

DCDOH is responsible for the development, issuance, and enforcement of the District of Columbia's water quality standards program. The District of Columbia had wet weather provisions in its water quality standards in prior years, but these have since been removed at the request of EPA Region 3. As part of the LTCP, WASA is requesting that wet weather provisions be brought back into the water quality standards program. This request will be reviewed by DCDOH.

Enforcement Program

EPA Region 3 is responsible for ensuring enforcement and compliance with NPDES permits within the District of Columbia. DCDOH is responsible for ensuring attainment of water quality standards within the District of Columbia through the District of Columbia Water Pollution Control Act of 1985.

State Profile — Maryland—Region 3

CSO Permits

8

Permitted CSO Outfalls

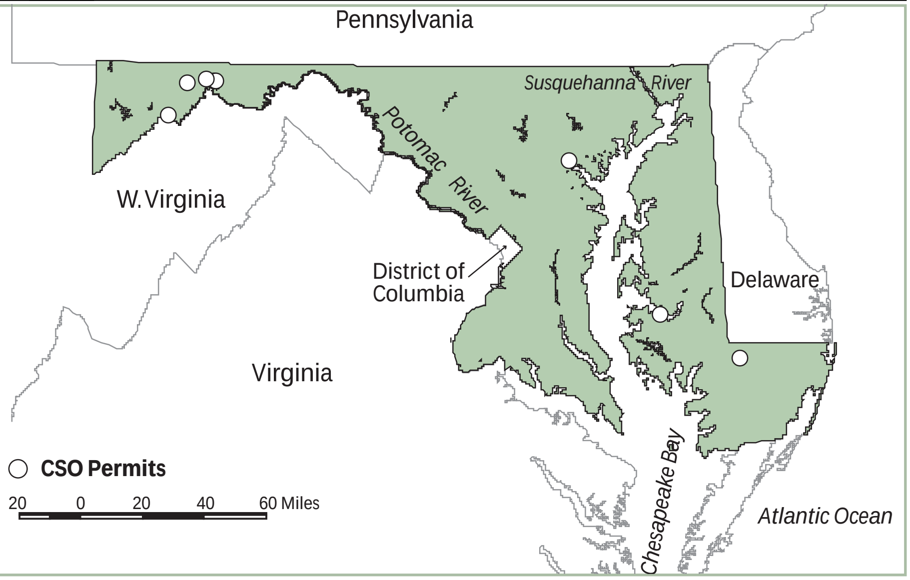
58

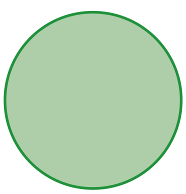
NPDES/Water Quality Standards Authority

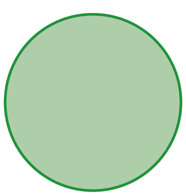
Maryland Department of the Environment (MDE)

Online Resources

www.mde.state.md.us/index.html







Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	8	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**8**	**100%**
Facility Plan Requirements		
LTCP	8	100%
Other Facility Plan	0	0%
No Facility Plan	0	0%
Total	**8**	**100%**

Program Highlights

- All eight CSO communities are required to implement NMC in their permits.
- All eight CSO communities are required to implement LTCPs under administrative or judicial orders, as well as through their permits.
- Smaller communities are subject to a less formal implementation process.
- Maryland is attempting to negotiate consent decrees with five communities currently under administrative orders for failing to develop an LTCP.
- Initial CSS assessments of the state identified nine CSO permittees; there are currently eight CSO permittees.

State Profile Pennsylvania—Region 3

CSO Permits

155

Permitted CSO Outfalls

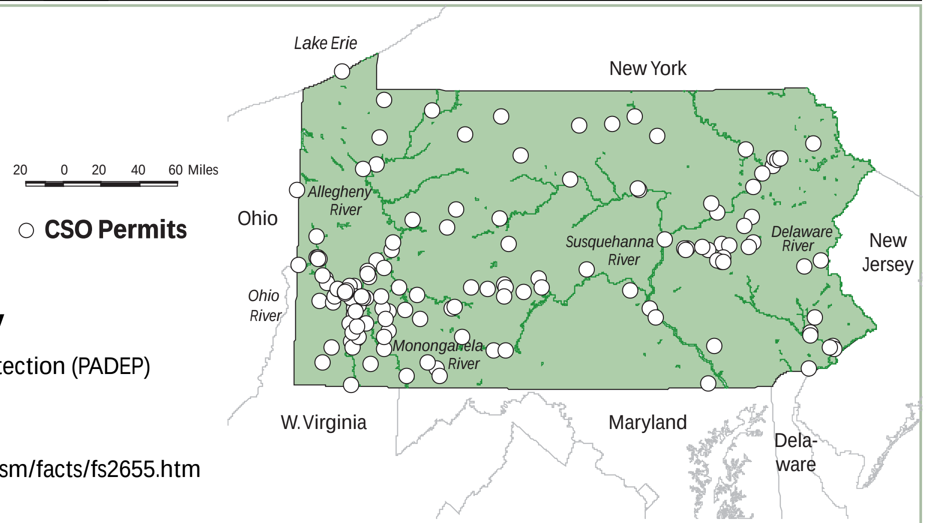
1,662

NPDES/Water Quality Standards Authority

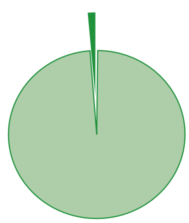
Pennsylvania Department of Environmental Protection (PADEP)

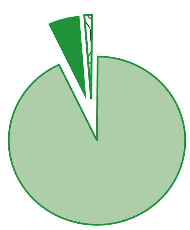
Online Resources

www.dep.state.pa.us/dep/deputate/watermgt/wsm/facts/fs2655.htm



Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	153	98.7%
Some BMPs	0	0%
No BMPs	2	1.3%
Total	**155**	**100.0%**
Facility Plan Requirements		
LTCP	144	92.9%
Other Facility Plan	2	1.3%
No Facility Plan	9	5.8%
Total	**155**	**100.0%**





Program Highlights

- Pennsylvania has the greatest number of CSO communities (155) and CSO discharge points (1,662) in the nation.
- PADEP developed a 1991 State CSO Strategy, which was revised in 1995 to reflect the 1994 EPA CSO Control Policy; a State Policy is expected in 2001.
- PADEP is not currently considering revisions to State water quality standards for CSO-impacted areas, but will explore them in the upcoming triennial review.
- 55 CSO communities have submitted LTCPs (three in draft format) and 24 have been approved by the state (two conditionally). NMC documentation has been submitted by 112 communities.
- The number of CSSs identified in the state rose from an initial 147 to 155, primarily due to inclusion of combined satellite collection systems.

Strategy for CSO Control and NPDES Permitting

PADEP developed its initial state CSO Strategy based on the 1989 National CSO Control Strategy. In 1995, PADEP revised the Strategy to include the elements identified in the CSO Control Policy. The revised Strategy required municipal dischargers to identify CSO locations and implement the NMC with additional long-term controls being required, as necessary, to comply with water quality standards. CSO communities undergoing reissuance of an NPDES permit, or those eligible for and seeking coverage under a general CSO permit, were issued permits that reflected the Strategy's requirements and a compliance schedule.

Permitting, enforcement, and compliance activities related to the revised Strategy were delegated to the regional PADEP offices. PADEP encouraged communities to use the national guidance documents available for NMC and LTCPs in meeting their permit requirements. PADEP also co-hosted an EPA-funded two-day workshop for officials from communities with CSSs to better engage them in the program in 1997.

Permitting Program

PADEP's six regional offices (Northeast, Southeast, Southcentral, Northcentral, Southwest, and Northwest) are responsible for NPDES permitting (including CSOs) within their geographic areas. In response to the initial state CSO Strategy, PADEP began requiring implementation of the six minimum measures (or NMC) in permits of CSSs. When the Revised Strategy was issued in 1995, PADEP added the remaining three NMC and the LTCP requirements, which have been included in permits reissued since 1995.

PADEP also developed a CSO general permitting process. General permits were made available only to small communities that met specific eligibility requirements and mainly included satellite collection systems that operate and maintain a CSS, but send wastewater to another town or regional facility for treatment. Notice-of-intent submittal requirements for coverage under a CSO general permit were minimal; however, coverage included many of the same CSO requirements as the individual NPDES permit.

Most CSO communities in Pennsylvania have CSO requirements in their permits. Approximately 112 communities have submitted NMC documentation and 55 have submitted LTCPs (three in draft format).

Water Quality Standards Program

Development and implementation of water quality standards in Pennsylvania is also a primary responsibility of PADEP. A change in water quality standards must be approved through an independent regulatory review commission, submitted to the Environmental Quality Board for review and approval, and then sent to the state legislature for final approval. Based on the involved state process for altering standards and negative connotations of lowering or downgrading water quality standards, PADEP does not believe UAAs or revisions to state standards for CSO-impacted waters are workable. These issues will be explored in the upcoming triennial review.

Enforcement Program

PADEP regional offices are responsible for enforcement and compliance activities, including review of all CSO documents and reports required to be submitted according to the NPDES permit compliance schedule. PADEP activities have focused on getting requirements into NPDES permits, ensuring that CSO programs are being initiated, and reviewing submitted documentation. The Southwest Regional PADEP office, having the most CSO communities, has a review system in place for NMC based on the suggested evaluation checklist provided in the EPA publication, *Guidance for Nine Minimum Controls*. Informal enforcement notices of violations and noncompliance with the NMC are often issued, and consequently, updates to NMC documentation are required to demonstrate full implementation of the NMC. The other regional offices have incorporated enforcement of the CSO requirements through normal permitting and enforcement activities within the regional water quality management programs.

As permits that have CSO requirements expire and facilities apply for reissuance, PADEP determines their overall compliance status. EPA Region 3 has enforcement oversight, and has indicated that permits that are not in compliance with the schedule listed in the expiring NPDES permit should be brought into compliance through an enforcement action (rather than reissuing the permit with a new/revised compliance schedule).

State Profile Virginia—Region 3

CSO Permits

3

Permitted CSO Outfalls

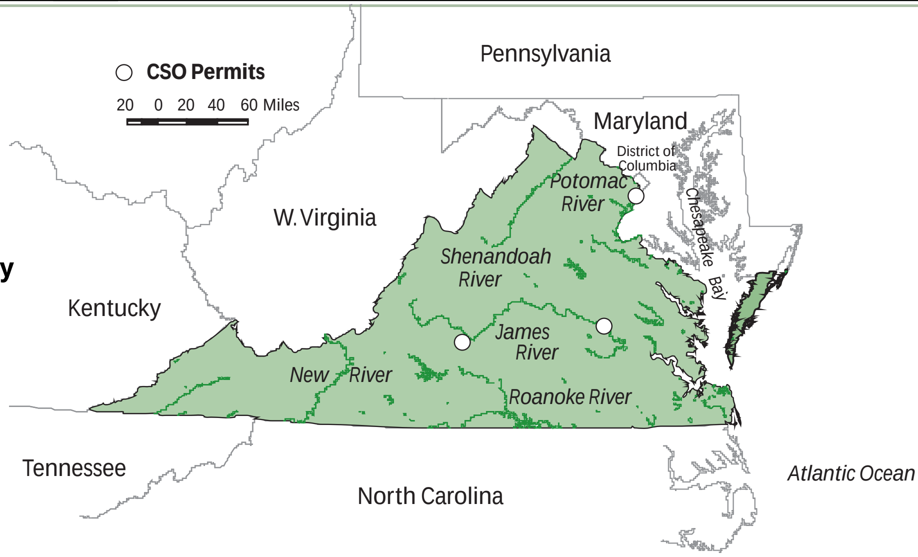
99

NPDES/Water Quality Standards Authority

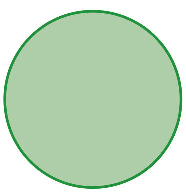
Virginia Department of Environmental Quality (VDEQ)

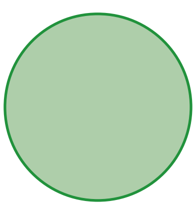
State Online Resources

www.deq.state.va.us/
www.deq.state.va.us/water/



Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	3	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**3**	**100%**
Facility Plan Requirements		
LTCP	3	100%
Other Facility Plan	0	0%
No Facility Plan	0	0%
Total	**3**	**100%**





Program Highlights

- Lynchburg is using sewer separation and interceptor replacement as components of its CSO implementation.
- Richmond implemented the NMC and developed an LTCP that provides controls for each CSO outfall and is designed to protect sensitive areas. Primary LTCP controls include a storage tunnel and retention basin. CSO planning was coordinated with watershed-based receiving water monitoring and earned Richmond First Place in EPA's 1999 CSO Control Program Excellence Awards.
- Alexandria has separated its entire CSS, except for Old Town. The City is using the NMCs as its LTCP. Alexandria is required to submit annual reports to VDEC documenting the volume frequency and duration of overflow events, based on results of a collection system model.
- Initial CSS assessments by VDEC identified four CSO permittees; there are currently three CSO permittees.

State Profile — West Virginia—Region 3

CSO Permits

58

Permitted CSO Outfalls

776

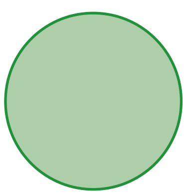
NPDES/Water Quality Standards Authority

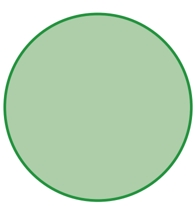
West Virginia Division of Environmental Protection (WVDEP)

State Online Resources

www.dep.state.wv.us/
www.dep.state.wv.us/wr/OWR_Website/index.htm

Status of CSO Policy Requirements





Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	58	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**58**	**100%**
Facility Plan Requirements		
LTCP	58	100%
Other Facility Plan	0	0%
No Facility Plan	0	0%
Total	**58**	**100%**

Strategy for CSO Control and NPDES Permitting

West Virginia has adopted EPA's CSO Control Policy, with some additional requirements specific to the state. All NPDES permits for communities with CSOs contain requirements to comply with the NMC and to develop an LTCP. WVDEP has not issued any enforcement orders for violations of these permit requirements.

State-specific requirements include documentation of implementation of the NMC in a report titled "CSO Final Plan of Action," and documentation of a required water quality study that must be conducted by each permittee on its CSO receiving waters. To date, 54 communities have submitted CSO Final Plans of Action, with 43 communities documenting implementation of all of the NMC.

The purpose of the water quality study is to evaluate the water quality impacts of CSOs on receiving waters. Communities are required to collect dry weather receiving water samples at least once a month, and wet weather receiving water data during at least

Program Highlights

- The NMC are required in all West Virginia CSO permits. 54 of 58 communities have documented some implementation of the NMC, and 43 have implemented all of the NMC.
- LTCPs are required in all CSO permits. To date, 16 LTCPs have been received by WVDEP and one has been approved.
- WVDEP requires that all CSO communities conduct water quality studies, which evaluate water quality impacts of CSOs on receiving waters. Approximately 21 communities have submitted water quality studies.
- Initial CSS assessments by WVDEP identified 56 CSO permittees; there are currently 58 CSO permittees.

Appendix B

Profiles of State CSO Programs

State Profile — Georgia—Region 4

CSO Permits

8

Permitted CSO Outfalls

19

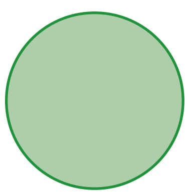
NPDES Authority/Water Quality Standards Authority

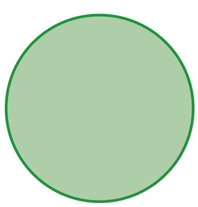
Georgia Department of Natural Resources
Environmental Protection Division (GDNR-EPD)

State Online Resources

www.ganet.org/dnr/environ/

Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	8	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**8**	**100%**
Facility Plan Requirements		
LTCP	8	100%
Other Facility Plan	0	0%
No Facility Plan	0	0%
Total	**8**	**100%**





Program Highlights

- Georgia has eight CSO permits covering three CSO communities: Atlanta, Albany, and Columbus.
- All CSSs are meeting requirements associated with the NMC, as a result of State law requiring CSO elimination or upgrade in the early 1990s.
- The State does not consider LTCPs to be completed until post construction compliance monitoring has been conducted; therefore, no systems in Georgia have completed LTCP requirements.
- Initial GDNR-EPD assessments identified six CSO communities. Three have since completed separation projects, leaving three CSO communities in the state.

Strategy for CSO Control and NPDES Permitting

Georgia has three CSO communities, dominated by the large Atlanta system, which holds six of the state's eight CSO permits. In 1989, there were six CSO communities; over time, half of those cities have separated and are no longer considered CSO communities by GDNR-EPD. All CSO communities have adopted the NMC as a result of CSO permit requirements.

Due to a recent court ruling in an enforcement action, both GDNR-EPD and EPA Region 4 are reviewing Atlanta's CSO documents, including the recently submitted Atlanta CSO Remedial Measures Report. Atlanta's CSO program will likely cost approximately $1 billion when completed.

Columbus has an advanced demonstration facility for CSO treatment technologies. Studies at the facility have involved exploring various vortex separation and filtration processes for pollutant removals, as well as various disinfection methods for pathogen inactivation. Columbus has spent approximately $95 million on CSO controls.

Permitting Program

The NPDES program is administered through GDNR-EPD. The NMC are required for all systems; however, there is no regular reporting mechanism for communities to send this information to the state. Draft LTCPs have been developed by the communities. The state, however, does not consider LTCPs to have been completed until all monitoring has been conducted. Therefore, no systems in Georgia have completed the LTCP requirements.

Water Quality Standards Program

In Georgia, the water quality standards officials do not have direct interaction with the CSO program as the LTCPs are being developed or reviewed. The City of Atlanta is requesting a water quality standards review as part of its effort to develop and implement an LTCP.

Enforcement Program

GDNR-EPD has enforcement authority for CSOs in Georgia. The City of Atlanta is under a Federal Consent Decree regarding its CSO program. Because of the complexity of the issues in Atlanta, and as a result of a lawsuit in district court, the State of Georgia, EPA Region 4, and a Federal district judge all have some degree of authority over Atlanta's program. EPA Region 4 and GDNR-EPD have joint review authority over Atlanta's LTCP. Atlanta did not achieve compliance with the NMC on schedule and has other non-CSO related violations.

CSO Permits

17

Permitted CSO Outfalls

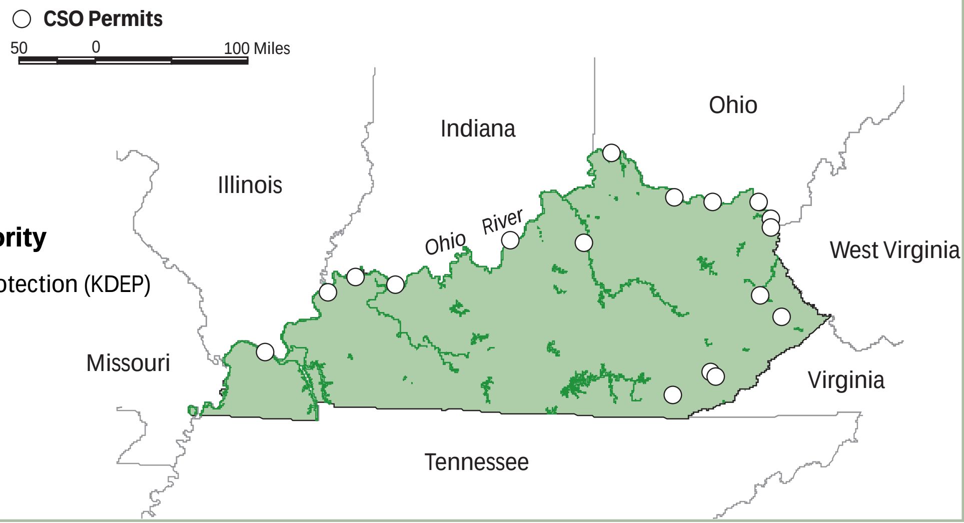
299

NPDES/Water Quality Standards Authority

Kentucky Department for Environmental Protection (KDEP)

State Online Resources

www.nr.state.ky.us/nrepc/dep/dep2.htm



Status of CSO Policy Requirements

Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	13	76.5%
Some BMPs	0	0%
No BMPs	4	23.5%
Total	**17**	**100%**

Status of CSO Policy Requirements	Number of Permits	Percent
Facility Plan Requirements		
LTCP	13	76.5%
Other Facility Plan	1	5.9%
No Facility Plan	3	17.6%
Total	**17**	**100%**

Strategy for CSO Control and NPDES Permitting

KDEP began its CSO control program in the early 1990s. Kentucky implemented the program by developing standard CSO-related permit language for its NPDES permits. This standard language requires an approved Combined Sewer Operational Plan (CSOP). The CSOP has three principal objectives:

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

The specified contents of the CSOP follow the NMC and LTCP provisions of the CSO Control Policy, although the terms "NMC" and "LTCP" are not explicitly used in the permit language. Nonetheless, the NMC requirements are outlined in the standard permit

Program Highlights

- Of the seven CSO communities that have implemented and documented the NMC, six have also submitted and initiated LTCPs. For the remaining 10 CSO communities, NMC and LTCP documentation is in progress or is not required. No community is overdue with its submittals.
- Kentucky explicitly promotes a comprehensive watershed management approach for all point and nonpoint sources in the CSO permit language. Covered sources include storm, separate sanitary, and combined sewer systems.
- Kentucky encourages use of the presumption approach over the demonstration approach in developing LTCPs.
- Initial CSS assessments of the State identified 18 CSO permittees; there are currently 17.

language. In addition, the CSO community is required to evaluate and select alternatives for CSO controls, as well as develop a schedule of implementation, which is updated annually in required CSOP annual reports. When selecting long-term CSO controls and performance goals, the state encourages use of the "presumption approach" over the "demonstration approach.".

Other components of KDEP's approach involve watershed management and flood protection. The state promotes, explicitly in the CSO permit language, a comprehensive watershed management approach for all point and nonpoint sources, including storm, separate sanitary, and combined sewer systems. CSO-related permit language also requires coordination of the implementation of community flood protection programs and CSO abatement programs, such that implementation of one program does not adversely impact the other.

Permitting Program

Since the early 1990s, all NPDES permits covering CSO communities have contained a Special Conditions section for CSOs. This section lists the authorized overflow locations and states that this authorization is premised on the conditions outlined within the permit. The conditions generally include implementation of the NMC and development and implementation of an LTCP. The elements of the NMC and the LTCP are to be documented in the CSOP, which must be approved by the state. Annual updates to the CSOP must also be submitted to the state to maintain compliance with the permit.

Seven of the 17 CSO communities have implemented and acceptably documented the NMC. Six of these seven communities have also submitted and initiated implementation of LTCPs, but no community has completed implementation of an LTCP. (The single sewer separation project that has been completed was not done as part of an LTCP.)

For the remaining communities, NMC and LTCP documentation is either in progress and not yet due to the state, or not required. Four CSO communities do not have documentation requirements, although they do have NMC and LTCP language in their permits. Submittals are not considered necessary since: 1) two communities have an inactive system, i.e., rarely have overflows; 2) one community is in the process of separating its collection system; and 3) one community is deactivating its treatment facility and connecting its collection system to another CSS where documentation is required.

Water Quality Standards Program

A formal state process for review and evaluation of water quality standards exists; however, none of the CSO communities have requested a water quality standards review to date. Consequently, no review of water quality standards for a CSO receiving water has been conducted.

In general, KDEP staff responsible for the water quality standards program are not involved in the CSO planning process, and generally do not give CSO-impacted waters any special consideration during the triennial review process for water quality standards.

Enforcement Program

No enforcement order within the State of Kentucky is CSO-related. One CSO community is involved in an enforcement action, but it is not specifically related to a CSO issue. NPDES permits are the only enforceable mechanism used to date for the NMC and LTCP requirements in CSO communities, and this has resulted in general compliance with state submittal schedules and progress in implementation.

State Profile — Tennessee—Region 4

CSO Permits

3

Permitted CSO Outfalls

50

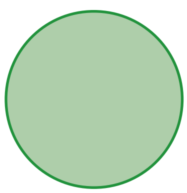
NPDES Authority

Tennessee Department of Environmental Conservation (TDEC)

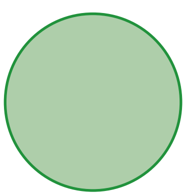
Online Resources

www.state.tn.us/environment/
www.state.tn.us/environment/water.htm#Program

Status of CSO Policy Requirements



Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	3	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**3**	**100%**



Status of CSO Policy Requirements	Number of Permits	Percent
Facility Plan Requirements		
LTCP	3	100%
Other Facility Plan	0	0%
No Facility Plan	0	0%
Total	**3**	**100%**

Program Highlights

- CSO communities were required to submit a CSO study by administrative order.
- All CSO permits require communities to implement BMPs similar in scope to the NMC, and to monitor CSO discharges.
- Bristol and Knoxville chose complete sewer separation as their primary control. Bristol had completed separation prior to the CSO Control Policy.
- Initial CSS assessments by TDEC identified five CSO permittees. Two have since been separated and there are now only three.

Strategy for CSO Control and NPDES Permitting

Tennessee began addressing CSOs in the mid-1980s. Each CSO community was issued an administrative order by TDEC that required the submission of CSO study and outlined a compliance schedule. CSO outfalls identified in the study were included in the community's NPDES permit. All CSO communities were required in their permits to implement several BMPs as part of their CSO control plan. The BMPs required by TDEC are analagous to the NMC. CSO communities are also required to monitor the frequency, duration, and pollutant loading from CSO outfalls. TDEC uses the monitoring information to help characterize the water quality impacts of the CSO discharges.

Two cities completed separation projects and are no longer considered by TDEC to be combined systems. As part of their CSO control plans, the three remaining communities chose a combination of wastewater treatment plant and pump station upgrades, optimization of in-line storage, construction of sewage holding tanks, and implementation of primary treatment at CSO outfalls.

State Profile — Illinois—Region 5

CSO Permits

107

Permitted CSO Outfalls

813

NPDES Authority

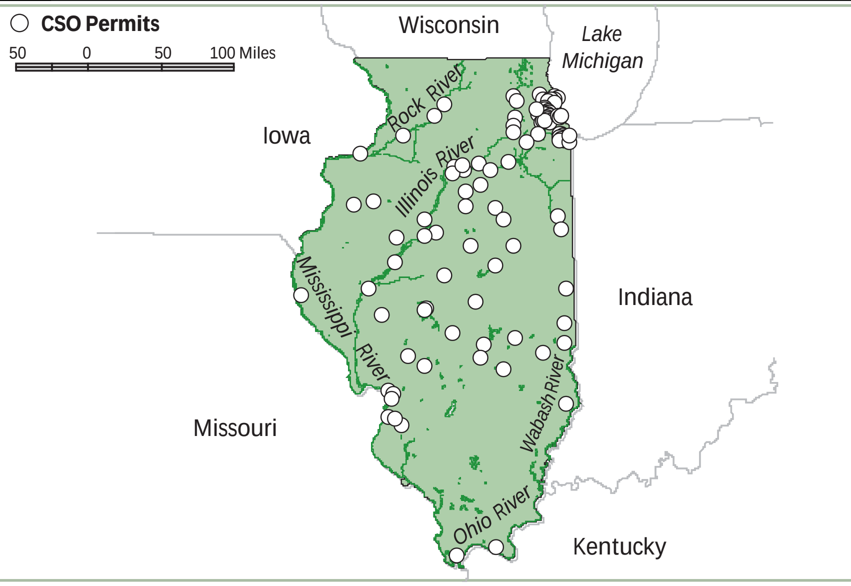
Illinois Environmental Protection Agency (IEPA)

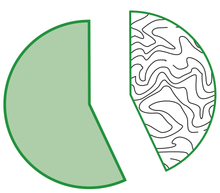
Water Quality Standards Authority

Illinois Pollution Control Board (IPCB)

Online Resources

http://www.epa.state.il.us/





Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	61	57.0%
Some BMPs	46	43.0%
No BMPs	0	0%
Total	**107**	**100%**
Facility Plan Requirements		
LTCP	0	0%
Other Facility Plan	107	100%
No Facility Plan	0	0%
Total	**107**	**100%**

Program Highlights

- Illinois' program includes an approach pre-dating the 1994 CSO Control Policy in establishing control criteria presumed to protect water quality and allowing a demonstration that some other criteria are protective.
- 61 of the CSO communities are implementing the NMC. The remaining 46 have implemented the six minimum measures identified in EPA's 1989 CSO Strategy. Permits issued since 1994 require the NMC; however, public notification is required only for CSO discharges to sensitive areas.
- CSO treatment is often provided in the form of primary treatment at the headworks of the WWTP.
- There is one federal enforcement action involving a CSO community in Illinois.

Strategy for CSO Control and NPDES Permitting

IEPA has treatment standards in place for CSOs under Section 306.305 of the Illinois Code. The treatment standards presume that CSO communities are meeting water quality standards as long as they are meeting three conditions:

- All dry weather flows and the first flush of storm flows, as determined by IEPA, shall meet applicable effluent standards;
- Additional flows, up to ten times the average dry weather flow for the design year, shall receive a minimum of one hour retention for primary treatment and 15 minutes retention for secondary disinfection; and
- Flows in excess of ten times dry weather flow shall be treated to the extent necessary to prevent depression of oxygen levels and accumulations of sludge deposits, floating debris, and solids.

Communities can alternatively apply for an exception to the above requirements, and IPCB has approved exceptions for 21 CSO communities that did not need to meet the requirements of Section 306.305. These "exception" communities, which include Aurora, Cairo, and Alton, generally have reduced requirements written into their IPCB orders.

Illinois asserts its CSO program is similar to the federal CSO Control Policy because the Section 306.305 treatment standard is similar to the presumption approach in the federal policy, while the exception procedure is similar to the demonstration approach.

CSO treatment is often provided in the form of primary treatment at the headworks of the WWTP.

Permitting Program

IEPA is the NPDES authority. Illinois has 107 CSO communities, of which 61 are required to implement the NMC. Compliance with the NMC is typically documented in Operation and Maintenance reports or Municipal Compliance Plans produced by the communities. All CSO communities have permit requirements for the six minimum measures identified in the EPA's 1989 National CSO Control Strategy; notices were issued in 1994 that the additional three measures would be required. Most communities responded and have had updated operational plans approved. Permits issued since 1994 include requirements for all of the NMC. Illinois does not require public notification of CSO events, except in designated sensitive waters.

Including Chicago, 56 permittees in Illinois are included in the Chicago Tunnel and Reservoir Project (TARP). Nearly all of these communities have satellite collection systems that use the treatment plants of the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC), but have their own CSO outfalls. Many of these communities, whose permits were issued in 1994 and have not yet been reissued, are awaiting reissuance of the MWRDGC permit. They will be covered under an associated general permit.

Plans for controlling CSOs were primarily developed prior to the CSO Control Policy and included in municipal or facilities plans. Recently issued permits are now requiring that CSO communities develop monitoring plans to verify whether the controls put in place have achieved the goals of protecting water quality. If monitoring indicates that water quality objectives are not being met, new control plans will have to be developed.

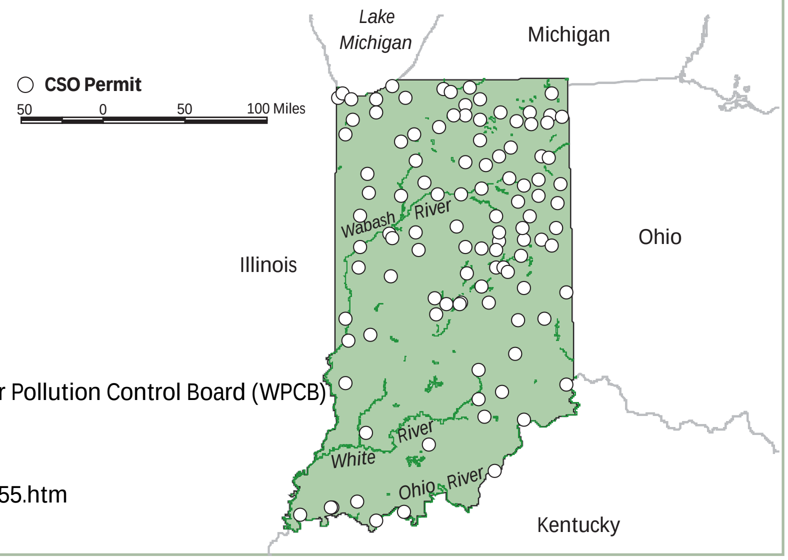
Water Quality Standards Program

Water quality standards are the under jurisdiction of IPCB. Illinois bacterial standards are based on a geometric mean fecal coliform level of 200 cfu/100ml, with no more than 10 percent of samples exceeding 400 cfu/100ml. This standard is applicable May through October.

The State asserts that most communities in Illinois are meeting the requirements of Section 306.305, which is presumed to meet water quality standards in Illinois. As mentioned previously, 21 CSO communities have an exception to Section 306.305.

Enforcement Program

Through a Performance Partnership Agreement, EPA is providing IEPA with direct compliance and enforcement assistance in the following areas: performing wet-weather inspections, with emphasis on CSO and SSO inspections; offering pretreatment WWTP seminars; and facilitating seminars for industrial users of specific WWTPs. There is one federal CSO enforcement action in Illinois. IEPA does not have administrative order authority.



CSO Permits

107

Permitted CSO Outfalls

898

NPDES Authority

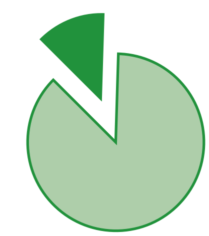
Indiana Department of Environmental Management (IDEM)

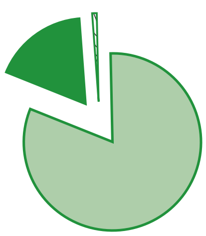
Water Quality Standards Authority

IDEM; public comment and disputes handled by Indiana Water Pollution Control Board (WPCB)

Online Resources

www.dep.state.pa.us/dep/deputate/watermgt/wsm/facts/fs2655.htm





Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	93	86.9%
Some BMPs	0	0%
No BMPs	14	13.1%
Total	**107**	**100%**
Facility Plan Requirements		
LTCP	87	81.3%
Other Facility Plan	1	1.0%
No Facility Plan	19	17.7%
Total	**107**	**100%**

Program Highlights

- Indiana has 107 CSO permits, covering 105 CSO communities.
- Most permits issued since 1994 require NMC (93 out of 107). Previously, permits required only six minimum controls.
- Indiana communities report compliance with the first eight NMC through submission and approval of Operation and Maintenance Plans; the ninth NMC is satisfied through Stream Reach Characterization and Evaluation Reports (SRCER).
- Most permittees are required to develop LTCPs (87 of 107). Five have been submitted to date.
- A law passed in 2000 (SEA 431) will allow temporary suspension of designated use following a storm event; guidance has recently been provided for communities on this provision.
- Initial CSS assessments of the state identified approximately 130 CSO permittees; there are currently 107 CSO permittees.

Strategy for CSO Control and NPDES Permitting

IDEM issued its Final Combined Sewer Overflow Strategy in May 1996. Amendments were in accordance with EPA's 1994 CSO Control Policy. The IDEM final strategy enhances the previous 1991 State CSO strategy's six minimum control requirements by including three additional controls and adding a requirement for the development of an LTCP. Operational plans that were previously submitted by communities to document implementation of the six minimum controls would have to be updated via the NPDES permit process or through permit modification to account for the newly added minimum controls.

Permitting Program

IDEM is the NPDES authority. CSO communities are required to implement the NMC; 93 of 107 permits have NMC requirements. CSO communities are also required to submit a CSO Operational Plan as part of the Operation and Maintenance Plan documents. The Operational Plan (CSOOP) serves as the reporting mechanism for documentation of the NMC. A SRCER is required for most communities; it addresses the monitoring requirement of the NMC. Several small communities and communities that are planning to separate its sewers do not have requirements to develop SRCERs.

LTCPs are required in 87 of 107 NPDES permits, however most of the LTCP due dates are in 2001 and beyond. Some communities that are separating their sewers or whose permits have not been recently renewed do not have LTCP requirements. Five communities have submitted LTCPs; none have been approved.

IDEM conducts inspections of CSO facilities on an annual or biannual basis. About 75 percent of the inspections are conducted by IDEM, while EPA Region 5 conducts the remaining 25 percent.

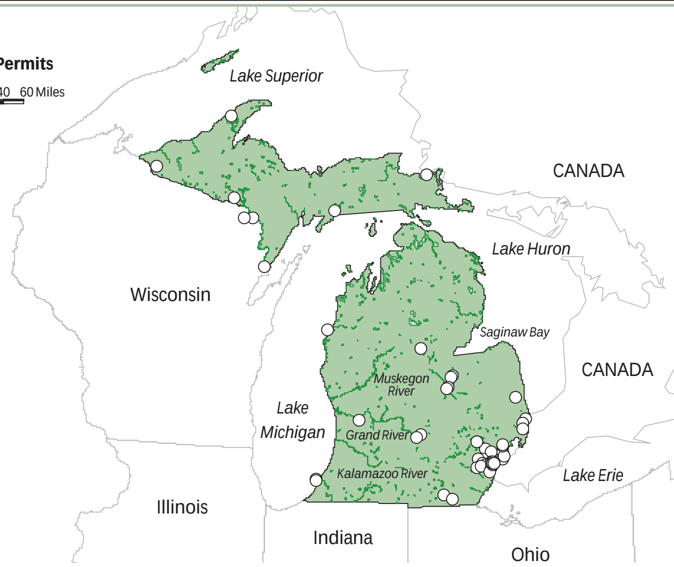
Water Quality Standards Program

The Indiana WPCB is the rule-making arm of the IDEM water group and is responsible for reviewing and revising water quality standards. Use attainability analyses and water quality standards reviews are conducted by IDEM. In 1990, Indiana required that all waters at all times must support full-body contact uses. The state defines full-body contact as a daily maximum level for *E. coli* of 235 cfu/100ml, which has subsequently been judicially interpreted as an end-of-pipe standard. Partly as a result of this decision, the legislature adopted SEA 431 in 2000 to allow targeted relief from this requirement, provided specific criteria are met.

Under SEA 431 CSO communities may request a suspension of designated use for no more than four days after CSO discharge. IDEM guidance on SEA 431 provisions was issued in May 2001. Between 50–75 percent of CSO communities are expected to take advantage of the SEA 431 suspension of use. Such suspensions of use are considered to be changes to water quality standards and must be reviewed and approved by EPA. Suspensions of use are not likely to take place in areas that are genuine swimming areas, such as the beaches on Lake Michigan.

Enforcement Program

Several CSO communities have been issued warnings of noncompliance, generally for failure to develop a CSOOP or a SRCER. In 2000, seven communities received a warnings of noncompliance. An additional two communities are expected to be referred to enforcement for failure to develop a SRCER in 2001. Five additional communities have already been referred to enforcement for failure to develop a CSOOP, SRCER, or both.



CSO Permits

52

Permitted CSO Outfalls

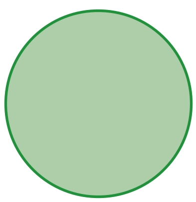
297

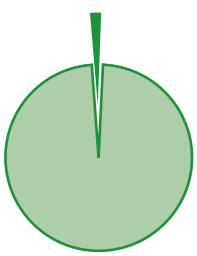
NPDES Authority/Water Quality Standards Authority

Michigan Department of Environmental Quality (MDEQ)

State Online Resources

www.deq.state.mi.us/





Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	52	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**52**	**100%**
Facility Plan Requirements		
LTCP	51	98%
Other Facility Plan	0	0%
No Facility Plan	1	2%
Total	**52**	**100%**

Program Highlights

- Michigan requires design storm-based "adequate treatment" as a basis for the LTCP design. CSO communities may propose alternate treatment levels similar to EPA's "demonstration approach."
- The Rouge River Valley (Metro Detroit) is the largest CSO project, encompassing 48 communities (20 permits).
- 48 of 52 CSO communities have submitted LTCPs and received State approval.

Strategy for CSO Control and NPDES Permitting

MDEQ requires that all CSO communities implement the NMC, and develop an LTCP. Although Michigan did not place emphasis on solids and floatables control during the interim/initial phases of the CSO Control Plans, control of solids and floatables has been required as part of the construction phase of the LTCP. Michigan requires that communities either eliminate (via sewer separation) or provide "adequate treatment" of CSOs. Adequate treatment is defined as follows:

- Retention and full treatment of the one-year, one-hour design storm.
- Primary treatment of the ten-year, one-hour design storm (primary treatment is defined as 30-minute detention time).
- Limited treatment of flows above the ten-year, one-hour design storm.

Communities that meet these requirements are presumed to meet water quality standards, corresponding to a more protective standard than the presumption approach outlined in EPA's 1994 CSO Control Policy. Some communities are attempting to demonstrate that they can achieve water quality standards with lesser treatment than that required under Michigan's adequate treatment definition. This approach is explicitly allowed in the permit.

In addition to the design standards above, approximately 25 communities have separated their sewers and are no longer considered CSSs. Several others have eliminated CSO outfalls.

Permitting Program

MDEQ is the NPDES authority. Michigan's CSO program is implemented in two phases. Phase I requires operational improvement to minimize overflows, overflow monitoring, and construction of interim CSO control projects where feasible. Phase I also requires development of a final program leading to elimination or adequate treatment of CSOs. Phase II is the implementation of the final program in subsequent NPDES permits. All communities have submitted LTCPs, and all plans have had some degree of approval, with the exception of some projects and communities in the Rouge River watershed.

A special case in the State of Michigan is the Rouge River Watershed in and around Metro Detroit, which includes 48 communities and is spread over three counties in southeast Michigan. The Rouge River is a National Demonstration Project for wet weather pollution control and watershed management. Approximately 20 CSO-related NPDES permits are associated with communities in the Rouge River area. In many cases, these permits include several co-permittees, including the county and neighboring communities. Total costs for CSO control in the Rouge River watershed are expected to total $1-$3 billion when all controls are implemented by approximately 2005.

Water Quality Standards Program

MDEQ has jurisdiction over the water quality standards program. In general, Michigan water quality standards staff are not involved in LTCP reviews, except when a community is attempting to demonstrate that it can achieve water quality standards with lesser treatment than that required under Michigan's "adequate treatment" approach. All communities meeting the design standards specified for CSO control are presumed to meet water quality standards.

Michigan rules allow the use of alternate design flows (i.e., alternate to 7Q10 low flows or 95 percent exceedance flows) when determining water quality-based requirements for intermittent wet weather discharges such as treated combined sewer overflows.

Enforcement Program

In cases where municipalities have been unwilling or unable to agree to corrective program schedules acceptable to MDEQ, enforcement actions have been taken. Several "Director's Final Orders" have been issued to communities to develop and implement an LTCP. In addition, there is litigation and a consent order in the Rouge River Watershed. EPA Region 5 and the federal district court are also actively reviewing progress in the Rouge River CSO program.

State Profile Minnesota—Region 5

CSO Permits

3

Permitted CSO Outfalls

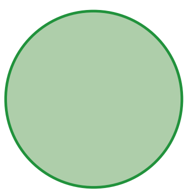
9

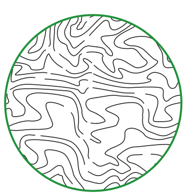
NPDES/Water Quality Standards Authority

Minnesota Pollution Control Agency (MPCA)

Online Resources

www.pca.state.mn.us/water/index.html





Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	3	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**3**	**100%**
Facility Plan Requirements		
LTCP	0	0%
Other Facility Plan	3	100%
No Facility Plan	0	0%
Total	**3**	**100%**

Program Highlights

- Sewer separation has been required in permits since the late 1970s, before issuance of the CSO Control Policy. Permit conditions are essentially the NMC, and separation is the LTCP.
- A 10-year, $331 million sewer separation program in Minneapolis, St. Paul, and South St. Paul was more than 95 percent complete when the CSO Control Policy was published in 1994. Separation was completed in 1996.
- Minneapolis and St. Paul still have eight outfalls that are capable of having a CSO; however, the two CSOs belonging to St. Paul have not overflowed within the past 5 years. The cities monitor inflow and infiltration sources and will close the regulators when they have verified that sufficient flow has been removed. Five to six regulators may remain open to protect upstream facilities. South St. Paul has no remaining outfalls and is no longer a CSO community.
- In 1993, the City of Red Wing began a program to separate all remaining combined sewers within 10 years. The program is on schedule.

State Profile

Ohio—Region 5

CSO Permits

93

Permitted CSO Outfalls

1,421

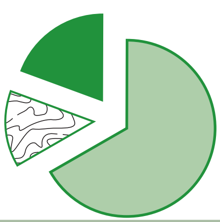
NPDES/Water Quality Standards Authority

Ohio Environmental Protection Agency (OEPA)

Online Resources

www.epa.state.oh.us/oepa.html

Status of CSO Policy Requirements



Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	77	82.8%
Some BMPs	0	0%
No BMPs	16	17.2%
Total	**93**	**100%**
Facility Plan Requirements		
LTCP	62	66.7%
Other Facility Plan	13	14.0%
No Facility Plan	18	19.4%
Total	**93**	**100%**

Strategy for CSO Control and NPDES Permitting

OEPA issued its revised CSO Strategy in 1995, which closely follows EPA's CSO Control Policy. Prior to 1995, OEPA required six minimum measures for CSO communities. The major provisions of Ohio's CSO Strategy require communities to:

- Develop an Operational Plan that includes documentation of the NMC.
- Conduct wet weather stress testing to maximize the ability of the wastewater plant to treat wet weather flows.
- Develop an LTCP.

There are some exceptions to the requirement to develop an LTCP. Small communities that are separating their sewers are not required to develop an LTCP. Communities that do not discharge to State Resource Waters, bathing waters, or within 500 yards of a public water supply intake, and for which there are no documented water quality

Program Highlights

- Operational Plans are required by Ohio's CSO Strategy to document implementation of the NMC.
- 80 percent (62 out of 77 required) of CSO communities have submitted Operational Plans. 16 communities are not required to implement the NMC. Of these, three have not had permits renewed since 1995 and 13 are completing separation projects.
- LTCPs are required for 62 of the 93 CSO communities. 25 LTCPs have been submitted to date and nine have been approved.
- Small communities that are separating sewers are not required to develop LTCPs.
- Initial CSS assessments of the State identified 101 CSO permittees; there are currently 93 CSO permittees.

impacts attributable to CSOs, initially must characterize and monitor the collection system, but are not immediately required to develop a full LTCP. Development of an LTCP may be required pending a review of the characterization and monitoring data or future stream survey results. Approximately 35 percent of CSO communities fall in this latter category.

Most Ohio CSO communities are using the presumption approach in their LTCPs, choosing to capture and provide treatment for 85 percent of wet weather flows reaching the collection system. Only a handful of communities are currently working with the demonstration approach as the basis for their LTCPs.

Permitting Program

Prior to 1995, OEPA only required six of the minimum measures to be implemented. For three CSO communities which have not had permits renewed since that time, the NMC are not required. For all others (except for 13 communities that are completing separation projects) the NMC are required by their NPDES permits. Operational Plans are the mechanism by which Ohio communities report on the implementation of the NMC. Approximately 80 percent of communities have submitted these plans to the state.

LTCPs are required for approximately 62 of the 93 communities. Small communities planning to separate its sewers are not required by the state to develop an LTCP. The state has received 25 of the required LTCPs to date, nine of which have been approved.

Water Quality Standards Program

Ohio has an active in-stream biological monitoring program to assess water quality and compliance with standards. Bacterial standards in Ohio water bodies are set for fecal coliform and *E. coli*; however, only fecal coliform standards are included in NPDES permits. The fecal coliform standards are:

Designated Use	Water Quality Standard
Secondary recreation	No more than10 percent of samples can exceed 5000 cfu/100mL
Primary recreation	Geometric mean cannot exceed 1000 cfu/100mL No more than 10 percent of samples can exceed 2000 cfu/100mL
Bathing beaches	Geometric mean cannot exceed 200 cfu/100mL No more than 10 percent of samples can exceed 400 cfu/100mL

The bacterial standards apply only during the May through October recreation season. Most water bodies in Ohio are classified for primary recreation, while bathing beach standards apply only at actual bathing beaches. Four communities in Ohio have requested water quality standards reviews and submitted biological monitoring data as part of its CSO control plans; reviews have been conducted as a result. No changes in standards have resulted from these reviews.

Enforcement Program

When an enforcement action is brought in Ohio, the entire NPDES permit is examined, not only the CSO provisions. OEPA has used both Judicial Consent Orders and Administrative Orders in its enforcement program, with the majority of enforcement actions taking the form of Judicial Consent Orders. OEPA has issued enforcement orders for: NMC implementation (three) LTCP development (two); and LTCP implementation (four). (There is overlap between the categories.) In addition, OEPA has joined in EPA Region 5 enforcement actions in Youngstown and Toledo.

State Profile Wisconsin—Region 5

CSO Permits

2

Permitted CSO Outfalls

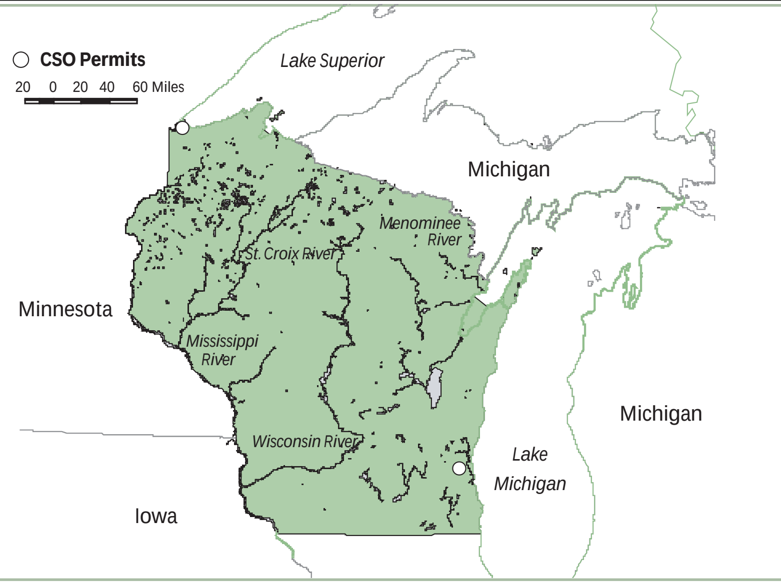
123

NPDES/Water Quality Standards Authority

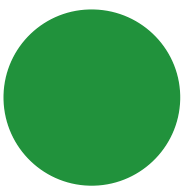
Wisconsin Department of Natural Resources (WDNR)

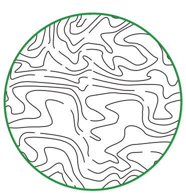
State Online Resources

www.dnr.state.wi.us/environmentprotect/water.html/



Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	0	0%
Some BMPs	0	0%
No BMPs	2	100%
Total	**2**	**100%**
Facility Plan Requirements		
LTCP	0	0%
Other Facility Plan	2	100%
No Facility Plan	0	0%
Total	**2**	**100%**





Program Highlights

- Wisconsin has two CSO permittees; Superior and Milwaukee.
- The Milwaukee Metropolitan Sewerage District has maintained an in-line storage system (ISS) for the conveyance and storage of wet-weather flows since 1994. This system consists of a series of tunnels having a total capacity of 400 million gallons and a combined length of more than 20 miles. Since 1994, the ISS has kept more than 37 million gallons of untreated CSO and SSO from entering area waterways, including Lake Michigan. Between 1994 and 2000, CSOs decreased from approximately 40–60 events per year to an average of 2.5 events per year.
- The City of Superior operates a satellite treatment facility for combined wastewater. The permit requires this facility to meet secondary effluent treatment limitations.
- The NMC have not formally been required in permits, since CSO facility plans were issued prior to the issuance of the CSO Control Policy.

State Profile — Iowa—Region 7

CSO Permits

15

Permitted CSO Outfalls

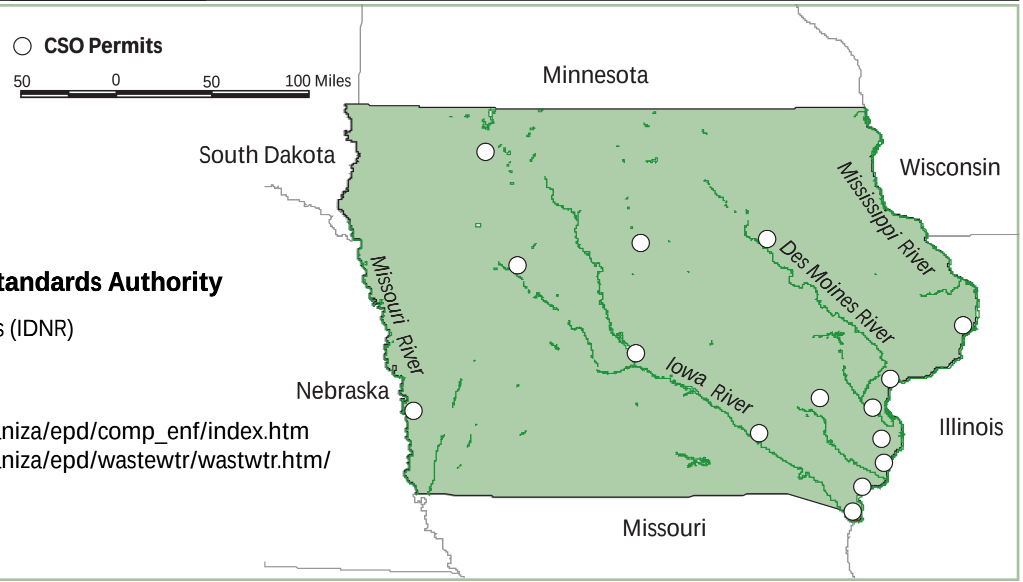
102

NPDES Authority/Water Quality Standards Authority

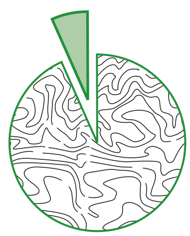
Iowa Department of Natural Resources (IDNR)

Online Resources

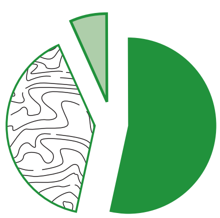
www.state.ia.us/government/dnr/organiza/epd/comp_enf/index.htm
www.state.ia.us/government/dnr/organiza/epd/wastewtr/wastwtr.htm/



Status of CSO Policy Requirements



Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	1	6.7%
Some BMPs	14	93.3%
No BMPs	0	0%
Total	**15**	**100%**



Status of CSO Policy Requirements	Number of Permits	Percent
Facility Plan Requirements		
LTCP	1	6.7%
Other Facility Plan	6	40.0%
No Facility Plan	8	53.3%
Total	**15**	**100%**

Strategy for CSO Control and NPDES Permitting

IDNR based its CSO program on the 1989 National CSO Control Strategy and formalized its state strategy in 1990 to:

- Eliminate dry-weather CSOs (ensure that CSOs occurred only during wet weather events).
- Encourage communities to separate sewers where possible.
- Bring all CSO discharge points into compliance with technology-based requirements of the CWA and applicable state water quality standards.
- Minimize the impacts of wet-weather overflows on water quality, aquatic biota, and human health.

The strategy also outlines an approach and time frame for inventorying all CSO discharge points; evaluating current water quality standards criteria and stream use

Program Highlights

- The current state CSO strategy was developed in 1990 and requires evaluating hydraulic capacity and incorporating the six minimum measures into operations and maintenance plans; the strategy was incorporated into NPDES permits issued/reissued through the mid-1990s.
- Some CSOs were addressed under FEMA-funded hydraulic capacity separation and upgrade projects following Mississippi River floods.
- IDNR is working to incorporate the NMC and LTCPs into permits, with stakeholder involvement, as they are reissued.
- 13 of 15 facilities have documented capacity upgrades, separation, hydraulic rehabilitation, and general improvements to treat more wet-weather flows; these improvements are generally included in facility planning documents and capital improvement plans, or were formalized through a compliance schedule in an enforceable order for hydraulic overloads.

designations, and technology-based limitations for wet-weather CSO water quality impacts; a rule-making process within the state for implementing the strategy; and a process for including this in the NPDES permitting process.

After the CSO Control Policy was developed, Iowa chose to continue with implementation of its current state strategy, citing the following rationale: time and investment in formalizing the Iowa state strategy, uncertainty of whether or not the CSO Control Policy would be modified and/or made law, similarity of the six minimum measures and the new NMC, lack of formal state program funding for the CSO program, and prioritization of permitting backlogs.

Permitting Program

Since inception of its CSO strategy through 1999, IDNR included a section called "Special Conditions—Combined Sewer Overflows" in all NPDES permits covering CSO communities that had not been identified as moving forward with complete separation. Generally, this condition included the following provisions:

- Documentation specifying the collection system as having both combined storm and sanitary sewers with CSOs.
- The hydraulic capacity determined within 6 months of issuance date, for each sewer between the point of overflow and the treatment facility.
- An operational plan, developed and submitted within nine months of issuance date, with the objective of meeting the six minimum measures outlined in the National CSO Control Strategy and implement the approved plan within one year.
- A re-opener clause related to possible changes in state standards or effluent limits related to CSOs.

During the last round of permit reissuance, EPA Region 7 objected to IDNR not including the CSO Control Policy program elements in NPDES permits for CSO communities. IDNR now has an approach of contacting the CSO communities to develop a consensus/stakeholder approach and time frame for implementing the NMC and developing an LTCP. This approach is formalized in a special CSO section of the reissued permit. Beginning in 2000, reissued permits include a special condition with the following stipulations:

- Development and submission of an operational plan for implementing the NMC within six months of permit issuance;
- Implementation of the operational plan within 24 months of issuance and documentation of implementation;
- Submission of an LTCP within 36 months of issuance;
- Provision not to discharge any pollutant at a level that causes or contributes to an in-stream excursion above the numeric or narrative criteria in Iowa's water quality standards; and
- A re-opener clause that addresses changes in water quality standards, information indicating that the proposed level of CSO controls aren't meeting water quality standards, or new information generated from the LTCP.

To date, one CSO community permit has been reissued with identified milestones for implementing the CSO Control Policy objectives in the NPDES permit, and three others are pending reissuance. Of the original 20 CSO communities identified, five have completely separated their systems, and one community was found not to have a combined sewer system. Recently, Iowa issued a draft permit to the City of Des Moines for its CSOs, effectively increasing the number of Iowa permits by one. Des Moines had been covered under a regional wastewater treatment provider's permit.

Based on the 2000 Amendments to the CWA, IDNR plans on evaluating the codification of the CSO Control Policy and determining how to formally incorporate the Policy into its state regulatory program.

Water Quality Standards Program

While a process for evaluation of water quality standards was identified in the IDNR CSO Strategy, the approach was not formalized or implemented state-wide. IDNR staff responsible for the water quality standards program are not involved in the CSO planning process, have not conducted any reviews for receiving waters impacted by CSOs, and generally do not give CSO-impacted waters any special consideration during the triennial review process for water quality standards.

Enforcement Program

Ongoing enforcement actions within Iowa's CSO communities are not specifically CSO-related. Administrative orders and other actions, at the state and regional level, have been issued to address effluent limits and loadings issues related to hydraulic capacity problems during wet weather conditions. Those orders within CSO communities have led to CSO planning, abatement, and elimination.

State Profile

Kansas—Region 7

CSO Permits

3

Permitted CSO Outfalls

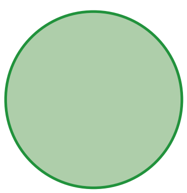
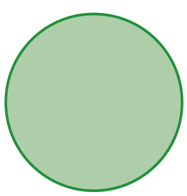
71

NPDES/Water Quality Standards Authority

Kansas Department of Health and Environment (KDHE)

Online Resources

www.kdhe.state.ks.us/
www.kdhe.state.ks.us/water/index.html

Status of CSO Policy Requirements		Number of Permits	Percent
	**BMP Requirements**		
	NMC	3	100%
	Some BMPs	0	0%
	No BMPs	0	0%
	Total	**3**	**100%**
	**Facility Plan Requirements**		
	LTCP	3	100%
	Other Facility Plan	0	0%
	No Facility Plan	0	0%
	Total	**3**	**100%**

Program Highlights

- All three CSO communities (Kansas City, Atchiston, and Topeka) have submitted plans for implementation of the NMC. All three NMC plans have been approved by KDHE and the communities are implementing them.
- Permits for all three CSO communities require submittal of an LTCP. Kansas City and Topeka have submitted their LTCPs for review by KDHE, these plans are presently under review.
- The NPDES permit for Atchison, effective September 1, 2001, requires completion of an LTCP by October 1, 2004.

CSO Permits

9

Permitted CSO Outfalls

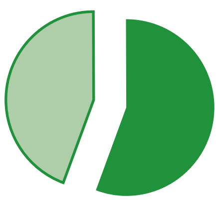
49

NPDES/Water Quality Standards Authority

Missouri Department of Natural Resources (MDNR)

Online Resources

www.dnr.state.mo.us/deq/homedeq.htm
www.dnr.state.mo.us/deq/wpcp/homewpcp.htm



Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	4	44.4%
Some BMPs	0	0%
No BMPs	5	55.6%
Total	**9**	**100%**
Facility Plan Requirements		
LTCP	4	44.4%
Other Facility Plan	1	11.2%
No Facility Plan	4	44.4%
Total	**9**	**100%**

Program Highlights

- CSO planning for Kansas City has been a high priority due in part to highly-publicized CSO/SSO problems in Brush Creek. Kansas City is implementing the NMC and developing an LTCP.
- The City of Cape Girardeau is nearing completion of their sewer separation program.
- The Metropolitan St. Louis Sewer District has submitted an LTCP to MDNR.
- The City of Sedalia and MDNR are negotiating effluent limitations for a CSO treatment project.
- Missouri will be reissuing expired permits with requirements for the NMC and LTCPs.

CSO Permits

2

Permitted CSO Outfalls

26

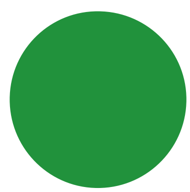
NPDES/Water Quality Standards Authority

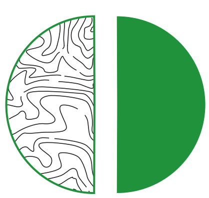
Nebraska Department of Environmental Quality (NDEQ)

State Online Resources

www.deq.state.ne.us/
www.deq.state.ne.us/Programs.nsf/pages/WQD

Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	0	0%
Some BMPs	0	0%
No BMPs	2	100%
Total	**2**	**100%**
Facility Plan Requirements		
LTCP	0	0%
Other Facility Plan	1	50%
No Facility Plan	1	50%
Total	**2**	**100%**





Program Highlights

- The Cities of Omaha and Plattsmouth are Nebraska's only CSO dischargers. The City of Ord, which was previously identified as having some combined sewers, has eliminated CSO discharges.
- Omaha has voluntarily implementied the NMC and is developing a watershed approach to LTCP development.
- Neither community has a CSO requirement in its current permit. CSO requirements will be added to the Plattsmouth general NPDES permit when it is reissued, and Omaha will have a separate CSO permit by the end of 2001.

Strategy for CSO Control and NPDES Permitting

Plattsmouth discharges to the Missouri River. Permit requirements to address CSO discharges will be included in the reissuance of its general NPDES permit, which is currently under review.

Omaha, which discharges to the Missouri River and tributaries, has voluntarily implemented the NMC. The management plan for implementing the NMC was submitted to NDEQ in 1997. This management plan continues to be revised as necessary to reflect operation and maintenance changes.

Omaha is also in the process of collecting background information so that a watershed approach can be used in developing an LTCP. Elements of the watershed-based LTCP include defining baseline conditions, developing the range of beneficial uses, defining CSO and non-CSO control levels, and the selection and implementation of a CSO control program. NDEQ anticipates issuing a separate CSO permit to the City of Omaha before the end of 2001.

State Profile South Dakota—Region 8

CSO Permits

1

Permitted CSO Outfalls

1

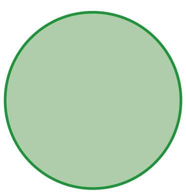
NPDES/Water Quality Standards Authority

South Dakota Department of Environment and Natural Resources (SDENR)

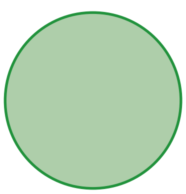
State Online Resources

www.state.sd.us/denr/denr.html

Status of CSO Policy Requirements



Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	1	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**1**	**100%**



Status of CSO Policy Requirements	Number of Permits	Percent
Facility Plan Requirements		
LTCP	1	100%
Other Facility Plan	0	0%
No Facility Plan	0	0%
Total	**1**	**100%**

Program Highlights

- South Dakota's one CSO community, Lead, chose sewer separation as its primary CSO control.
- Sewer separation is approximately10 percent complete.

Strategy for CSO Control and NPDES Permitting

Lead, South Dakota's only CSO community, has one outfall. It was originally listed in the permit for the local sanitary district; however, following the release of EPA's CSO Control Policy, the sanitary district requested that the CSO outfall be removed from its permit and the community be permitted directly. In December of 1996, the SDENR issued a CSO permit to the community. The permit required implementation and documentation of the NMC and development of an LTCP. The LTCP was approved in January of 1999, and it recommended sewer separation as the primary CSO control. The community has completed approximately 10 percent of the proposed sewer separation and plans to achieve full separation within the next few years.

CSO Permits

3

Permitted CSO Outfalls

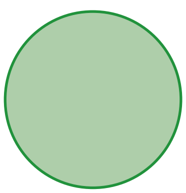
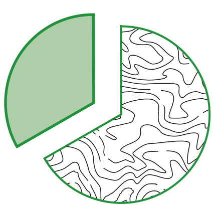
41

NPDES/Water Quality Standards Authority

California Regional Water Quality Control Boards (RWQCBs)

Online Resources

www.swrcb.ca.gov/

Status of CSO Policy Requirements		Number of Permits	Percent
	**BMP Requirements**		
	NMC	3	100%
	Some BMPs	0	0%
	No BMPs	0	0%
	Total	**3**	**100%**
	**Facility Plan Requirements**		
	LTCP	1	33%
	Other Facility Plan	2	67%
	No Facility Plan	0	0%
	Total	**3**	**100%**

Strategy for CSO Control and NPDES Permitting

California's State Water Resources Control Board (SWRCB) administers water rights, water pollution control, and water quality functions for the state as part of the California EPA. Operating under the umbrella of the SWRCB are nine RWQCBs, whose missions are to develop and enforce water quality objectives and implementation plans that will best protect the beneficial uses of the state's waters. The RWQCBs are region-specific, recognizing local differences in climate, topography, geology and hydrology within the large and diverse State of California. RWQCBs develop "Basin Plans" for each major watershed, issue NPDES permits, take enforcement action against violators, and monitor water quality. The two CSO communities (San Francisco and Sacramento) fall within the governance of RWQCB Region 2 (San Francisco Bay) and RWQCB Region 5 (the Central Valley), respectively.

Program Highlights

- California's RWQCBs develop Basin Plans which include CSO planning.
- California has three CSO permits covering two CSO communities: San Francisco and Sacramento.
- San Francisco's CSO approach was developed prior to EPA's 1994 CSO Control Policy; NMC were implemented and an LTCP was not required because of pre-policy planning efforts.
- Sacramento's CSO program was adapted to meet CSO Policy requirements; NMC were implemented, and an LTCP was approved and is being implemented.
- Provisions were developed for variations to State water quality standards and designated uses.
- Initial CSS assessments of the State identified four CSO permittees; currently there are three CSO permittees.

San Francisco Bay RWQCB CSO Approach

In the mid-1970s, the San Francisco Bay RWQCB approved a Master Plan and Environmental Impacts Statement and Report developed to address San Francisco's CSOs. These planning efforts led to the implementation of a series of structural and in-system controls prior to the development of the CSO Control Policy. Site-specific solutions were developed and implemented based on San Francisco's sewer system (two distinct systems; many steep slopes hindering storage in the system), with the overall objective of addressing CSO impacts on public health in high-contact areas such as public parks, beaches, and recreation areas.

Central Valley RWQCB CSO Approach

In the early 1990s, the Central Valley RWQCB required Sacramento to initiate planning to address hydraulic capacity issues that were resulting in frequent CSOs, SSOs, and street flooding. After the development of the CSO Control Policy, the Central Valley RWQCB required that the previously initiated planning effort include the provisions identified in the Policy. This approach was formalized by requiring NMC and development of an LTCP in the NPDES permit. The LTCP focused on reducing flow into the system and increasing both storage and treatment capacity.

Permitting Program

The RWQCBs issue NPDES permits within California, with input and oversight by EPA Region 9. All CSO facilities have special conditions within the permit that outline facility requirements, which are based on the community's status in planning and implementing CSO controls. All California NPDES permits for CSOs have narrative language requiring the ongoing operation of the system through use of the NMC.

In the San Francisco area, two NPDES permits contain CSO provisions. The San Francisco Bay RWQCB has included special CSO language in both permits requiring the NMC and certifies that all NMC have been implemented. LTCPs are not required in San Francisco as pre-policy planning efforts led to nonstructural and structural controls that meet its water quality objectives (see discussion under Water Quality Standards Program below).

In Sacramento, the Central Valley RWQCB administers one NPDES permit to the City of Sacramento for the CSS and wet weather treatment facilities. The Central Valley RWQCB formalized the requirements for NMC and the development of an LTCP in the 1996 reissuance of the NPDES permit. The RWQCB has certified that all NMC are in place and that projects identified in the approved LTCP will be completed by 2001.

Water Quality Standards Program

By law, the RWQCBs are required to develop, adopt, and implement Water Quality Control Plans (Basin Plans) for major watersheds. Basin Plans provide the framework for protection of water quality in California; they also include identification of beneficial uses, water quality objectives to protect beneficial uses, and an implementation program to ensure that beneficial uses are protected. All basin plans undergo triennial reviews. The SWRCB developed two state-wide water quality control documents: Water Quality Control Plan for Ocean Waters of California (Ocean Plan) and Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan). These plans describe objectives and effluent limitations for ocean waters. None of the plans specifically address CSO-impacted waters; however, general provisions are cited which consider modifications to water quality objectives in cases where compliance would be prohibitively expensive or technically impossible.

The San Francisco RWQCB has issued two orders related to CSO-impacted water quality standards:

- The Board Order, issued in 1979, allowed for different long-term average overflow frequencies (1, 4, or 10) per year for specific overflow points within San Francisco's Bayside combined sewer system. The order was based on CSO planning information (i.e., facility costs to achieve specific overflow frequencies and associated water quality benefits), staff findings, and public input. The approach identified in the order was expected to provide adequate protection of beneficial uses.
- In 1979, the SWRCB also issued (and EPA Region 9 approved) an exception to all water quality standards in the Ocean Plan for shoreline CSOs for San Francisco's Oceanside combined sewer system (Order WQ79-16). The general findings, issued in 1979, indicated that this exception would not compromise the protection of ocean waters for beneficial uses. This approach would therefore be presumed to provide an adequate level of control to meet the water quality-based provisions of the CWA (and thus numerical limits applicable to treated shoreline CSOs were not needed).

There are no known CSO-related water quality standards actions within the Central Valley RWQCB.

Enforcement Program

The RWQCBs have authority to implement and enforce the water quality laws, regulations, policies, and plans to protect the waters of the state. RWQCBs have a number of formal and informal enforcement mechanisms that can be issued to CSO communities. For the two CSO communities in California, one enforcement action has been issued for violations of state water quality provisions directly related to CSOs. A Cease and Desist Order was issued to Sacramento requiring them to address chronic CSOs, SSOs, and sanitary sewage erupting from manholes during wet weather events. This order initiated Sacramento's pre-CSO Policy planning efforts and eventually led to the development and implementation of its LTCP.

State Profile Alaska—Region 10

CSO Permits

1

Permitted CSO Outfalls

3

NPDES Authority

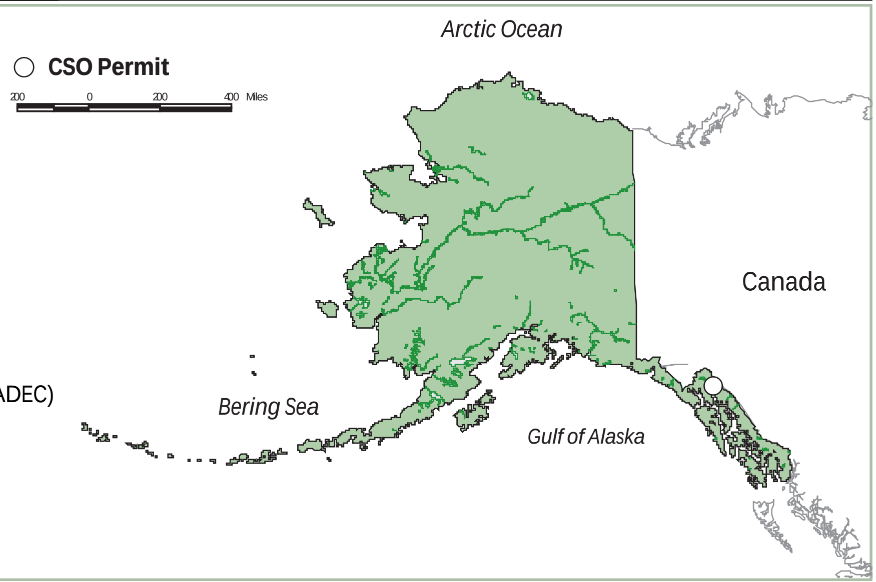
EPA Region 10

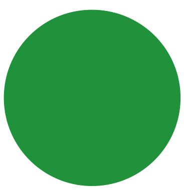
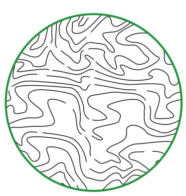
Water Quality Standards Authority

Alaska Department of Environmental Conservation (ADEC)

State Online Resources

www.state.ak.us/dec/deh/water/drinking.htm



Status of CSO Policy Requirements		Number of Permits	Percent
	**BMP Requirements**		
	NMC	0	0%
	Some BMPs	0	0%
	No BMPs	1	100%
	Total	**1**	**100%**
	**Facility Plan Requirements**		
	LTCP	0	0%
	Other Facility Plan	1	100%
	No Facility Plan	0	0%
	Total	**1**	**100%**

Program Highlights

- Alaska's one CSO community, Juneau/Douglas, chose sewer separation as its approach for long-term CSO control.
- EPA Region 10, the permitting authority, is proposing to require the NMC and separation plan as an LTCP alternative during re-issuance of the permit in December 2001.

Strategy for CSO Control and NPDES Permitting

Because Alaska has one CSO community (Juneau/Douglas), a state-wide CSO approach or strategy was not developed. The community chose to eliminate CSOs through systematic separation of its combined sewer, starting with separation in the lower, flatter areas and integrating sewer separation with other capital improvement projects. To reduce the overall number and severity of CSOs, the community also developed a protocol for routing more flow to the treatment facility as the separation work progressed. Implementation of this approach is ongoing.

Permitting Program

EPA Region 10 is the NPDES authority for Alaska; ADEC certifies the permits issued by the region. Since the community committed to separate its combined system, EPA Region 10 did not formalize the components identified in the CSO Control Policy into the last

NPDES permit (1996). EPA Region 10 included a CSO section in the permit requiring monitoring and reporting of CSOs. The current permit expires in 2001, and Region 10 indicates that the new permit will include provisions for implementing and reporting the NMC and for formalizing the sewer separation schedule.

Water Quality Standards Program

ADEC is responsible for the development, issuance, and implementation of Alaska's water quality standards. State standards do not allow for or address variances or amendments to current water quality standards for CSO-impacted waterways. The community's approach (i.e., separation) will eliminate the need for the state to consider variances or amendments to current water quality standards.

Enforcement Program

Both EPA Region 10 and ADEC are responsible for enforcement and compliance of NPDES permitting within the State of Alaska. There are no documented enforcement efforts or activities related to CSOs.

State Profile — Oregon—Region 10

CSO Permits

3

Permitted CSO Outfalls

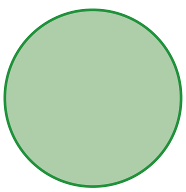
99

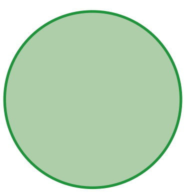
NPDES/Water Quality Standards Authority

Oregon Department of Environmental Quality (ODEQ)

Online Resources

http://waterquality.deq.state.or.us/wq/





Status of CSO Policy Requirements	Number of Permits	Percent
BMP Requirements		
NMC	3	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**3**	**100%**
Facility Plan Requirements		
LTCP	3	100%
Other Facility Plan	0	0%
No Facility Plan	0	0%
Total	**3**	**100%**

Program Highlights

- All three CSO communities (Astoria, Corvallis, and Portland) are under a stipulation and final order to reduce CSOs.
- Corvallis is eliminating overflows through the construction of additional treatment facilities (scheduled for completion by December 2001).
- Portland and Astoria are in the process of constructing additional treatment facilities.
- Oregon's overflow reduction program predates the CSO Control Policy (and the 1989 National CSO Control Strategy).
- Initial CSS assessments of the State identified 30 CSO permittees. There are currently three CSO permits.

Strategy for CSO Control and NPDES Permitting

Prior to the 1989 National CSO Control Strategy, ODEQ had a mechanism in place for addressing overflows. The program generally did not differentiate between overflows from combined and separate sanitary sewers. In 1981, the Oregon Environmental Quality Commission (EQC) adopted rules specifying that:

Sewerage Construction programs should be designed to eliminate raw sewage bypassing during the summer recreation season (except for a storm event greater than the 1 in 10 year 24-hour storm). A program and timetable should be developed through negotiations with each affected source. Bypasses which occur during the remainder of the year should be eliminated in accordance with an approved longer term maintenance based correction program. More stringent schedules may be imposed as necessary to protect drinking water supplies and shellfish growing areas." (OAR 340-41-034(3) (f)).

Oregon's policy provided a means to prioritize overflows for reduction or elimination. For example, overflows that contribute to shellfish contamination were among the first targeted for elimination. Many CSO communities within the Willamette Valley that experienced overflows during the summer recreation period were required to undertake corrective action to eliminate summer overflows; other CSO communities that were under a longer term permit schedule elected to separate its systems.

As the program progressed and permits came up for renewal, all CSO communities with reported outfalls were placed under a compliance schedule to eliminate overflows in accordance with the EQC policy, or were required to assess the frequency and duration of overflows to aid in determining further compliance actions that may be needed. Although these actions did not anticipate EPA's 1989 National CSO Control Strategy, Oregon's program did acknowledge the CWA objectives to address point sources of pollution that can affect compliance with water quality standards and beneficial use protection.

State Profile — Washington—Region 10

CSO Permits

11

Permitted CSO Outfalls

219

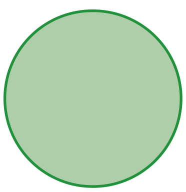
NPDES/Water Quality Standards Authority

Washington Department of Ecology (Ecology)

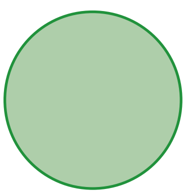
Online Resources

www.ecy.wa.gov/
www.ecy.wa.gov/programs/wq/wqhome.html

Status of CSO Policy Requirements



BMP Requirements	Number of Permits	Percent
NMC	11	100%
Some BMPs	0	0%
No BMPs	0	0%
Total	**11**	**100%**



Facility Plan Requirements	Number of Permits	Percent
LTCP	11	100%
Other Facility Plan	0	0%
No Facility Plan	0	0%
Total	**11**	**100%**

Strategy for CSO Control and NPDES Permitting

In 1985, the Washington state legislature enacted law within the state code to begin CSO planning through Ecology. The goal of the code was to achieve the greatest reduction in CSO discharges as soon as possible. In response to this code, Chapter 173-245 of the Washington Administrative Code (WAC), "Submission of Plans and Reports for Construction and Operation of Combined Sewer Overflow Reduction Facilities," was developed and enacted in 1987 to enable Ecology to administer the program. The principal features of the code required the development of a CSO reduction plan to reduce overflows to an average of no more than one per year. Required components of the reduction plans are as follows:

- Documentation of CSO activity—Complete a field assessment and mathematical modeling study to determine CSO locations, overflow frequency, and overflow quantity, and to characterize the discharge and assess historical impacts.

Program Highlights

- The state program was initiated in 1987 and allows one average annual overflow.
- The state program requires a CSO reduction plan, which Ecology equates to an LTCP. Annual reporting and five-year updates to CSO reduction plans are also required.
- All CSO communities have submitted NMC documentation, and all but one (a newly permitted facility) have submitted and are implementing CSO reduction plans.
- A CSO compliance schedule is included in the NPDES permits.
- Initial CSS assessments of the state identified 15 CSO permittees; there are currently 11 permittees.

- Analysis of control/treatment alternatives—Consider and assess use of BMPs (e.g., sewer ordinances, pretreatment, sewer maintenance programs, I/I programs, etc.), storage and disinfection, routing more flow to the plant, site/outfall treatment, and separation.
- Analysis of selected treatment/control projects—Analyze water quality impacts of the control projects.
- Priority ranking—Rank the selected control alternatives to ensure impacts to sensitive areas are the highest priority and other projects are ranked based on cost-effectiveness and overall environmental benefits.
- Schedule—Propose a schedule for achieving the greatest reduction as soon as possible (if more than five years; include the priority projects over the first five years).

Ecology evaluated its program and determined that it exceeded or met the goals of EPA's CSO Control Policy, certifying that CSO reduction plans equated to LTCPs. The only deficiency noted was in meeting the public participation component, which was not listed in the Ecology requirements. Ecology is working to ensure this requirement is met by CSO communities as they develop their controls and programs.

Permitting Program

NPDES permitting is handled through the four regional Ecology offices; three offices have CSO-permitted facilities with more than 70 percent of the facilities under the management of the Northwest regional office. All regional offices have included CSO conditions within the NPDES permit for CSO communities requiring the following:

- A list of CSO outfall locations.
- Annual reports on CSO activities and overflows for the past year and planned projects for the next year.
- A CSO reduction plan amendment, due upon renewal of the permit.
- A compliance schedule.

All CSO facilities have submitted NMC, and all but one (a newly permitted collection system) have submitted and are implementing controls identified in its CSO reduction plans. As permits are reissued, Ecology is attempting to include additional CSO conditions to ensure that public participation is addressed in CSO planning at all facilities.

Water Quality Standards Program

Water quality standards revisions and triennial reviews are conducted by Ecology's headquarters office. No special considerations are given to CSO-impacted waters, as the state's policy on CSOs (no more than one annual average overflow) is believed to enable communities to meet water quality standards. There are no provisions or plans for allowing revisions or variances to water quality standards within state waters.

Enforcement Program

Enforcement of the CSO program is handled through Ecology and inherently is included in the review of the annual CSO reports, progress made in meeting water quality objectives, and progress made in completing projects as outlined in the CSO reduction plan. Ecology staff can issue compliance or other enforcement orders that are incorporated into a compliance schedule attached to the NPDES permit. EPA Region 10 also has program oversight; however, there are no known EPA-enforcement actions related to CSO compliance in Washington.

Appendix C

CSO Community Case Studies

Community Case Study — Atlanta, GA—Region 4

Number of CSO Outfalls

10 (originally)
7 (currently)

Combined Sewer Service Area

19 square miles

Sewer Service Area

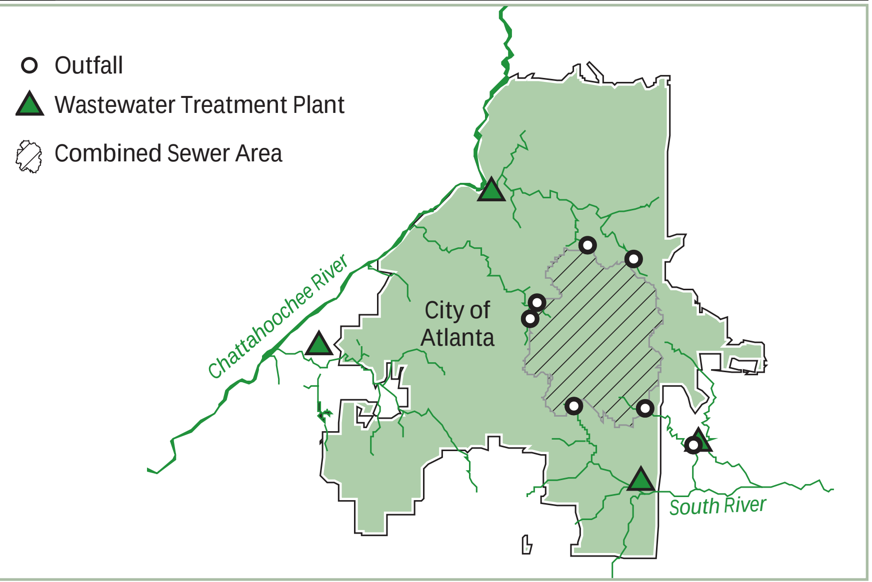
260 square miles

Wastewater Treatment Capacity

194 mgd (secondary)

Receiving Water(s)

South River, Chattahoochee River



Controls

- Atlanta constructed seven CSO control facilities, covered under six permits, which provide treatment to wet weather flows prior to discharge.
- The city separated approximately 15 percent of CSS area in the early 1990s.
- Additional proposed controls include two storage and treatment systems and localized sewer separation.

Photo: Trash screens at Atlanta's Intrenchment Creek CSO Center. *Courtesy of Atlanta Department of Public Works*

Program Highlights

- Settlement of a civil judicial enforcement action for violation of the Clean Water Act and Georgia Water Quality Control Act has required the city to develop and implement additional CSO controls.
- Controls implemented as of 2000 have reduced CSO volume by 60 percent and solids loading by 75 percent.
- The LTCP proposed by Atlanta in March 2001 will reduce overflow events from 60 to four per year per outfall.

Background on Atlanta CSOs

The CSS service area is centered in central downtown Atlanta. The city is situated on a ridge between the South River to the southeast and the Chattahoochee River to the northwest. Most of the city's CSOs are in the headward area of small watersheds that are tributary to these rivers. The CSO facilities are grouped according to the watershed in which they are located.

Atlanta's CSS covers approximately 19 square miles. It represents a small fraction of the city's sewer service area of 260 square miles, but it includes the most highly developed section in the Metro Atlanta region. This CSS area in the downtown business district serves approximately 103,000 residents and a daytime population of 202,000. Based upon a sewer system evaluation and survey of the East Side sewers, the city estimates that there are approximately 200 miles of combined sewers in the entire CSS.

Atlanta has four permitted POTWS: R.M. Clayton, Utoy Creek, Intrenchment Creek and South River. These facilities treated over 54 billion gallons of wastewater in 2000. There are also seven CSO treatment facilities covered under six permits.

A civil judicial enforcement action was taken jointly against Atlanta by the EPA, the Georgia Department of Natural Resources–Environmental Protection Division (GDNR-EPD), Upper Chattahoochee Riverkeeper Fund, Inc., the Chattahoochee Riverkeeper, Inc., and W. Robert Hancock, Jr. for violations of the CWA and Georgia Water Quality Control Act. Extensive CSO activity by the city during the last three years was undertaken in connection with the resulting CSO consent decree.

Status of Implementation

System Characterization

Atlanta constructed seven CSO control facilities in the mid-1980s and early 1990s to provide a level of CSO treatment that met state and federal regulations. The city also separated a 3.4-square-mile portion of the CSS area.

Three CSO treatment facilities, McDaniel, Custer, and Intrenchment Creek (the latter two covered under one permit), are located in east Atlanta. These facilities were constructed in the mid-1980s. Each one treats wet weather combined wastewater flows in a different manner.

- McDaniel CSO Facility – Low flows, up to 5.5 mgd, are captured and diverted to the South River wastewater treatment plant. In the event of higher flows, flow exceeds the interceptor sewer capacity and enters a 6 MG storage vault. While the vault is being filled, the stored storm water-sewage mixture is pumped to the sanitary sewer at a rate of 3 mgd. Any excess flow is coarse bar screened, disinfected, and routed over a weir into a tributary of the South River.
- Custer CSO Facility – Low flows are captured in a sanitary interceptor. When flows exceed 20 mgd, a gate closes the entrance to the interceptor sewer and all flow is routed over a weir through coarse bar screens into a concrete channel that leads to the Custer CSO Facility. High flows to the Custer CSO Facility are routed into a storage tunnel that connects to the Intrenchment Creek CSO Treatment Facility—or over the weir into Intrenchment Creek when the tunnel capacity is exceeded.
- Intrenchment Creek CSO Facility – The storage tunnel between the Custer outfalls and this facility is designed to capture and treat the first 30 to 34 MG of wet-weather flow to the tunnel. At the Intrenchment Creek CSO Treatment Facility, the captured flow is subjected to a physical and chemical treatment process and the effluent is then discharged into Intrenchment Creek. Treated effluent discharged from this facility contains lower concentrations of pollutants than discharges from the other East Area facilities, meeting the original 1985 reduction goal for biochemical oxygen demand and total suspended solids.

The four CSO facilities in the West Area of Atlanta are Greensferry, North Avenue, Tanyard Creek, and Clear Creek. These CSO facilities provide rotating fine screens and disinfection treatment.

An extensive system characterization and sampling program was conducted under a consent decree during 1999 and 2000 to characterize the CSS and discharges. EPA and GDNR-EPD approved the evaluation program on March 10, 1999 and approved the resulting evaluation report on September 21, 2000. To the best of the city's knowledge, this was the most extensive CSO characterization in the nation to date. In addition to the intensive system characterization, the city monitors overflows monthly as part of its permit conditions.

NMC

Creation of Maintenance, Operations, and Management Systems (MOMS) plans provided guidance to city personnel regarding the O&M requirements of each of the city's CSO facilities, as well as management strategies to control CSOs. The completed MOMS plans were submitted in December 1998 and were approved by EPA and GDNR-EPD in June 1999. The development of the MOMS plans addressed the NMC. There have been at least two dry weather overflows covered under the Consent Decree for which EPA and GDNR-EPD imposed a stipulated penalty. The overflows were due to non-sewer related problems (water line break and drinking water plant backwash).

The city has kept citizens informed of CSO developments with an informational website. Six Citizen Advisory Groups have been formed, and these groups have been given tours of CSO facilities and invited to attend public meetings to learn of developments in managing CSOs.

LTCP

The city submitted a proposed LTCP to EPA and GDNR-EPD in March 2001 under the requirements of the consent decree. The Administrative Order requires that EPA and GDNR-EPD authorize a plan, and that the city implement the plan by mid-2007, unless an alternative schedule is approved. It is the city's goal to complete the CSO consent decree agenda according to the schedule put forth in the Administrative Order.

The construction of two storage and treatment systems and the partial separation of additional areas are proposed in the LTCP. The storage and treatment systems will reduce the current number of overflows from approximately 60 or more per year to an average of four per year. CSO volume and pollution reduction at the outfalls will be at least 80 percent. Although there is already a significant improvement in the East Area with the storage units installed there, it will require three times more storage volume to reduce the number of events to only four per year. Reducing the number of discharges below the average of four per year increases the required storage (and cost) exponentially for only small improvements in pollutant reduction.

Costs and Financing

The city has invested about $244 million (1994 dollars) in the existing control facilities. This figure includes the total capital costs of planning, design, and construction of the CSO treatment facilities. The city has also spent $500 million for integrated wastewater treatment system improvement program and sewer system repair and relief projects, some of which provide additional treatment capacity in the sewer system. This figure does not include the capital cost of implementing the CSO consent decree activities to date, which were approximately $15 million. All of these capital activities were funded by bonds paid by the general funding available from the wastewater utility. The proposed LTCP is expected to require an additional capital cost of about $950 million (2001 dollars).

Financing for the preferred LTCP option is uncertain. While the city has good credit ratings and bonding capacity, the total funding needs may outpace the bonding capacity unless there are significant rate increases. The impact of the whole wastewater program, funded solely by monthly sewer bills, could be at least 2.6 times the current rate. This may constitute a high impact on households in Atlanta and could raise issues about the affordability of the program. The city is seeking assistance from EPA and GDNR-EPD to address this issue.

Water Quality Issues

CSO treatment is provided at each CSO outfall. The West Area CSO facilities have rotating fine screens and disinfection treatment. The East Area CSO facilities have storage and more advanced treatment. Even with these controls, the federal court ruled that Atlanta's CSOs were violating water quality standards. Because there is little opportunity for dilution at the outfall points, enforcement of water quality standards is at the end-of-pipe.

The CSO sampling results confirmed several characteristics widely known about storm water runoff and CSO. This evaluation also identified compliance issues for metals and toxicity, such as:

- Each sewershed needs individual consideration for developing representative concentrations.
- The hardness of both the CSO effluent and rainfall is relatively low, resulting in more stringent water quality criteria.
- The Intrenchment CSO Facility met the average and the maximum bacteria criteria. Fecal coliform levels from the Westside facilities still occasionally exceed the maximum criteria.
- Highly variable first flush effects were observed early in runoff events. The range of these effects was different from event-to-event and was not always present for every pollutant.
- Residual chlorine from the CSO treatment facility occasionally caused acute toxicity, based on whole effluent toxicity tests, whereas heavy metals did not cause toxicity. Dechlorinated effluent did not cause toxicity.
- The city collected supplemental storm water data using clean methods to better characterize metals and to determine contributions from parking lots and parks. Urban storm water discharges present challenges similar to CSO for complying with water quality standards. However, the majority of pollutants discharged from the CSO outfall were attributed to the deposition of sanitary sewage in the sewers during dry weather, rather than from storm water. The only storm water constituent that made a significant contribution was zinc.

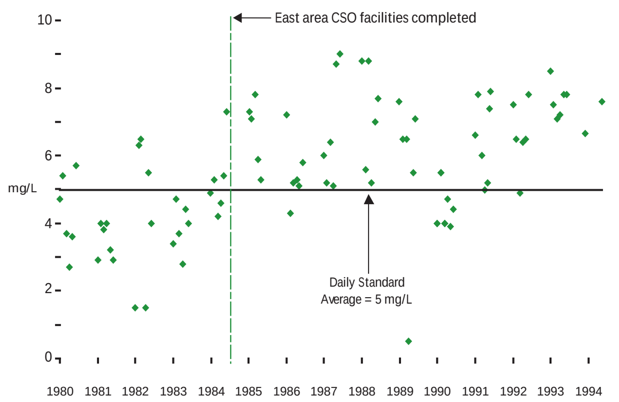
Enforcement Issues

The extensive CSO control activity during the last three years was undertaken in connection with the settlement of a civil judicial enforcement action taken jointly by the EPA, GDNR-EPD, Upper Chattahoochee Riverkeeper Fund, Inc., the Chattahoochee Riverkeeper, Inc., and W. Robert Hancock, Jr., for violations of the Federal Clean Water Act and Georgia Water Quality Control Act. The city is working diligently to meet all consent decree deadlines and will continue to implement its CSO and SSO programs under the settlement terms. The CSO consent decree calls for compliance by mid-2007, unless otherwise amended, and the SSO consent decree calls for compliance by 2014. In addition to the implementation of corrective CSO and SSO measures, the settlement requires Atlanta to create a greenway corridor and to clean up selected streams, as well as to pay a cash penalty of $3.2 million.

Results

The initial projects implemented in the mid-1980s in the East Area had the primary goal of reducing oxygen demanding substances in the South River. In addition to adding storage to the two CSO sewersheds, the South River and Intrenchment Creek wastewater treatment plant discharges were relocated to the Chattahoochee River. As shown in the figure at right, dissolved oxygen levels improved in the South River as a result, with reductions in CSO volume (60 percent), the number of CSO discharges (84 percent), and total CSO loadings (75 percent for total suspended solids).

Observed Summer Dissolved Oxygen Levels in the South River



Despite these improvements, the federal court still found that further improvements were necessary. The proposed LTCP calls for load reductions of approximately 85 percent.

Examples of Progress

Working closely with EPA, GDNR-EPD the Upper Chattahoochee Riverkeeper and other environmental organizations, the city has had no Discharge Monitoring Report violations at Atlanta's wastewater treatment facilities. However, the city has had dry weather overflows for which they have paid stipulated penalties.

The Atlanta Wastewater Systems Improvement Program accelerated ongoing sewer improvements, including a capacity certification program for new development and an intensive evaluation of sewer pipe conditions throughout the city. Many of the immediate sewer replacement and rehabilitation projects required under the terms of the SSO consent decree are projects that are included in the 1994 Bond Referendum approved by the voters (final bond issuance did not occur until 1999). Most of the major projects have been designed and some are under construction. Many moved forward as a result of the lawsuit and bills passed by the Georgia Legislature. A number of the projects originally included in the 1994 Bond Referendum have become outdated and must be redesigned.

All consent decree construction completion deadlines associated with the LTCP have been met to date. Interim improvements required to protect public health were completed for the East Side CSO facilities.

The city completed an extensive and thorough assessment of the CSS system. They are working with a citizen advisory group, environmental organizations, EPA, and GDNR-EPD to evaluate an array of long-term solutions to Atlanta's CSO water quality problems.

References

Tyler Richards, City of Atlanta, Atlanta, GA. Personal communication with Limno-Tech, Inc. staff on details of the CSS overflow plan and program, summer 2001.

Community Case Study — Bremerton, WA—Region 10

Number of CSO Outfalls

19 (originally)
16 (currently)

Combined Sewer Service Area

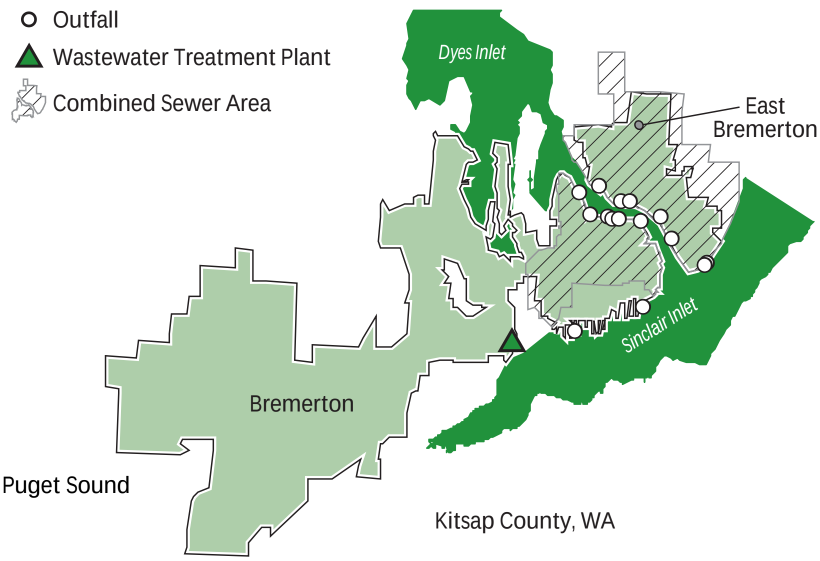
5.2 square miles

Wastewater Treatment Capacity

32.5 mgd (primary)
7.6 mgd (secondary)

Receiving Water(s)

Port Washington Narrows, Dyes Inlet and Sinclair Inlet of Puget Sound



Controls

- Sewer separation projects were initiated in 1983.
- The city ordinance provides reimbursement for storm water separation projects on private property (e.g. disconnecting roof leaders from the combined sewer system).
- Bremerton has used off-line storage and increased conveyance capacity in the sewersheds where controls have been implemented. This approach is also planned for other sewersheds.

Photo: City of Bremerton and Bremerton Naval Shipyard.
Courtesy of US Navy.

Program Highlights

- CSO outfalls have been reduced from 19 to 16.
- As of 2000, Bremerton achieved a 69 percent reduction in CSO volume and a 56% reduction in frequency of overflow events from baseline conditions.
- A consent order requires the city to limit CSOs to no more than one event per year at each outfall by December 2008.

Background on Bremerton CSOs

Bremerton's collection system serves 36,000 residents of the city and a small unincorporated portion of Kitsap County. The sewer system consists of 188 miles of gravity sewers, 33 pump stations, and 16 miles of force mains. The combined sewer service area comprises 5.2 square miles in ten sewersheds serving East Bremerton and West Bremerton. Inverted siphons carry sewage from East Bremerton under the Port Washington Narrows. All of the city's sewage is treated at the Charleston POTW, along with wastewater from the Puget Sound Naval Shipyard, other U.S. Navy facilities, and Kitsap County Sewer District No. 1. This plant has an average flow of 7.6 mgd and a maximum design flow of 32.5 mgd. It discharges into Sinclair Inlet, southwest of the City. Excess flows from the CSS are discharged from 16 outfalls located along the Port Washington Narrows and Sinclair Inlet of Puget Sound; 70 to 90 percent of this excess flow is estimated to be storm water or rain induced infiltration (RII).

Status of Implementation

The City of Bremerton began addressing CSOs in the late 1970s and separating its sewers in 1983. State legislation requires the city to limit CSOs to no more than one event at each outfall annually by 2011. The city agreed to meet a 2008 schedule specified in a federal consent decree resulting from a third party Clean Water Act lawsuit. Storm water discharge from new developments into the CSS is prohibited. The city must update its CSO reduction plan with each 5-year NPDES permit cycle, and submit a status report each May on implementation activities. The report provides details on the past year's frequency and volume for each CSO, and whether overflow at a site has increased over the baseline annual condition. Documentation of the previous year's CSO reduction accomplishments and planned projects for the next year are also included.

In 1992, the city completed its first CSO reduction plan in accordance with Washington State Department of Ecology (Ecology) guidelines (CH2M Hill, 1992). This plan included:

- Documentation of the CSO system and improvements.
- Computation of baseline annual frequency and volume of CSO discharges.
- Sampling and analysis of CSO discharges effluent and sediment at CSO structures and outfalls.
- Evaluation and selection of general control, reduction and treatment methods.
- Description (including costs) and evaluation of alternatives and recommendation of CSO reduction projects.
- Analysis of the effects of the proposed projects on the WWTP operation.
- Recommendations for future studies.
- Preparation of an implementation schedule and financing plan.

The 1992 CSO reduction plan proposed sewer separation as the primary means to reach the one event per year level in many of the city's sewersheds.

CSO volume and frequency data became available in 1994 when the CSO and rainfall monitoring system went on-line. Monitoring helped to identify sewersheds that receive direct storm water inflow and areas that had large amounts of RII. It was found that large amounts of roof and parking lot drainage from private properties goes directly into the CSS. A city ordinance provides funding authority for a program to assist private property owners with development and implementation of storm water separation projects by January 2002 and beyond, as funds are available. This program is called the Cooperative Approach to CSO Reduction.

Bremerton has published three educational brochures, hosted workshops, developed an internet website, and produced a how-to video that covers the CSO reduction program goals and requirements (Berthiaume, 2000). Private property owners willing to disconnect storm water inflow can obtain free technical assistance, site assessments and detailed planning from a city representative. The City Council approved a reimbursement schedule that pays the property owner based on the type of connection and the effort it will take to redirect the storm water to its yard, the street, or other conveyance. Separation work completed in the right-of-way is provided at no cost to the property owner. The city representative and property owner work together under this program to complete the site assessment. The method of separation is agreed to in a signed contract. When the separation work has been completed, the property owner calls for a post-separation inspection. If completed per the agreement, payment is made to the property owner and the property status is updated in the city's wastewater account data base. Bremerton established a fee schedule for private properties that have improperly connected storm water to the sanitary sewer system. If a private property has a storm water connection to the sanitary sewer system, the existing storm water fee, based on a per account or equivalent impervious surface unit, is increased 25 percent annually, beginning in 2002 to 100 percent of the fee by January 2005.

In 1999, Bremerton developed a hydrologic and hydraulic conveyance model to support facility planning. The city also carried out additional work including an inflow and infiltration study, installation of flow meters, and smoke and dye testing. The city initiated a source-tracing program to be implemented if contaminants in CSOs exceed marine chronic water quality criteria.

Bremerton updated its CSO Reduction Plan in 2000 (HDR, 2000). CSO reduction alternatives were evaluated based on an October 30, 1997 storm event. This storm has a one-year recurrence interval with a high intensity accumulation of rainfall at the end of the storm with two days of wet antecedent conditions. The storm produced a high flows well suited for developing improvements primarily associated with increasing conveyance capacity. Reduction options that were considered included sewer separation, removal of RII, increased conveyance capacity, storage, and treatment. Significant findings included:

- Separation should be continued, but only to provide a long-term benefit for collection and treatment of sanitary sewage. Separation will not reduce the overflows to one event per year since a major portion of the extraneous flow during major events is from RII.
- Removal of RII is feasible only when cost-effective and achievable within the schedule.
- Providing some storage offers valuable benefits, particularly when combined with onsite treatment or conveyance, but is not cost effective in all sewersheds because of site limitations and the volume of combined sewage.
- Increased conveyance capacity is needed to prevent overflows, but downstream impacts on the sewers and increased flow to the WWTP need to be considered.
- Treatment of CSOs at the old Manette WWTP site was the most cost effective method of reducing untreated overflows from East Bremerton.

Many of the controls were completed in 2000. Flow slipping (intentional blocking of storm water from entering the CSS at catch basins for the purpose of routing, or slipping it, elsewhere) and installation of new storm water sewer mains also contributed to reduced CSO discharges during 2000.

Nine Minimum Controls

Bremerton addresses all of the NMC in its annual reports. Monitoring of CSOs and receiving water bodies began in 1995, and there are no ongoing problems with dry weather overflows or floatables. The city has water conservation, rain barrels, recycling, and hazardous waste disposal programs in addition to the programs previously described. The city sweeps all major streets every six to ten weeks, and cleans each catch basin annually. The city also initiated planning in individual storm water basins. These efforts all reduce contaminants in CSOs. Upgrades to wastewater collection system controls and the installation of a Supervisory Control and Data Acquisition (SCADA) system have increased overall system reliability.

Costs and Financing

Bremerton completed CSO control projects in three sewersheds at a capital cost of approximately $17 million. It is estimated that an additional $27 million is needed to complete improvements for the seven remaining sewersheds. Annual operation and maintenance costs are currently $4.5 million and are expected to increase to $6.0 million by 2008. The city's wastewater utility has no bonding capacity until 2007. Therefore, outside financial resources are necessary to complete the program. Existing projects were funded through Interfund Loans, Public Works Trust Fund (PWTF) loans, Centennial Clean Water Funds (CCWF) loans/grants, State Revolving Funds (SRF) loans, and user fees. Future projects will be funded by these sources plus direct congressional grant appropriations ($3.48 million to date). Current debt service for funding CSO projects through these programs adds $1.1 million to the annual cost to the wastewater utility. Assuming $40 million for CSO programmatic capital loan requirements, it is anticipated that annual debt service will increase to $2.6 million in 2008 providing existing low interest loan terms.

Local match requirements are a significant issue for the city. EPA regulations preclude using SRF as matching funds for grants and PWTF also does not allow using grant funds as match. The current implementation schedule is dependent on several revenue assumptions, including continued annual consumer rate increases consistent with inflation, a minimum 1 percent system growth, third party recovery from ongoing litigation, and financing with loans or grants. Without the financing and sufficient match, the city will not be able to meet the implementation schedule. According to the 2000 Washington Water and Wastewater Rate Survey, Bremerton has some of the most expensive wastewater rates in the state (number 36 of 39 surveyed, ranked from lowest to highest) at $45.10 per month (Black and Veatch, 2000).

The Cooperative Approach to CSO Reduction program is supported by a grant from the CCWF and matching funds from Bremerton. Revenues from the grant will be expended by mid-2002 and the city plans to continue the program with O&M funds through 2005. Beginning in January 2002, revenues collected from the new storm water fee will be used to offset the cost of design, construction and the operation and maintenance of the new CSO reduction facilities that are needed to control and treat the extra water from the remaining improper connections.

Water Quality Issues

Water quality issues in Puget Sound include a ban on commercial harvesting of shellfish, threats to public health, and threats to endangered species. Sinclair and Dyes Inlets have documented water quality problems from a variety of sources, including failing septic systems, urban runoff, industrial and military sites, and CSOs. Efforts to address these sources of pollution have helped to improve, but have not solved, water quality problems in the area.

The Bremerton-Kitsap County Health District has issued a closure advisory for all species of shellfish, crab, bottom fish, and rockfish in Dyes Inlet, Port Washington Narrows, and Sinclair Inlet due to chemical or biological pollution. The closure to commercial harvesting of shellfish, due to point and nonpoint pollution, impacts the economy, reduces jobs, and causes the public to avoid the use of beaches. Additionally, the health district has issued an advisory for areas that periodically experience high levels of point and nonpoint pollution during heavy rains. This advisory includes Dyes Inlet, Port Washington Narrows, and Sinclair Inlet. Public use of Port Washington Narrows includes four major waterfront parks and more than seven other public access sites. Year-round recreational uses of these waters such as sport fishing, scuba diving, and swimming increase the potential risk to the general population.

The US Navy's ENVVEST program is developing a model that can be used by the Washington State Department of Health (DOH) to determine the transport and fate of fecal coliform if the city were to have an overflow event. This is a cooperative program among the Navy, EPA, Ecology and other organizations. Shellfish beds have been periodically monitored since they have been closed to harvest since 1969. Significant efforts have been made to reduce point and nonpoint pollution.

The Dyes Inlet currently meets water quality standards for shellfish. However, due to the existence of CSO structures and the potential for an overflow event, the DOH has not opened these shellfish beds for commercial harvesting. Discussion of re-certifying the shellfish beds in Dyes Inlet for restricted or limited harvesting is possible once DOH has a tool to calculate the fate and transport of fecal coliform due to a CSO.

There are 22 square miles of critical nearshore salmonid habitat that surround the CSO outfalls and range up to four miles downstream of the discharges. CSOs potentially affect the Chinook and Chum Salmon and Bull Trout, which are threatened under the

Endangered Species Act. Studies are underway to determine the actual extent of the threat and the effects of reducing pollutant sources.

Enforcement Issues

In 1993, Bremerton entered into a Consent Decree that further addressed its CSOs but did not include sewer moratoriums. Amendments to this decree were adopted in 1999 through mediation (Ballbach, 1999). The city agreed:

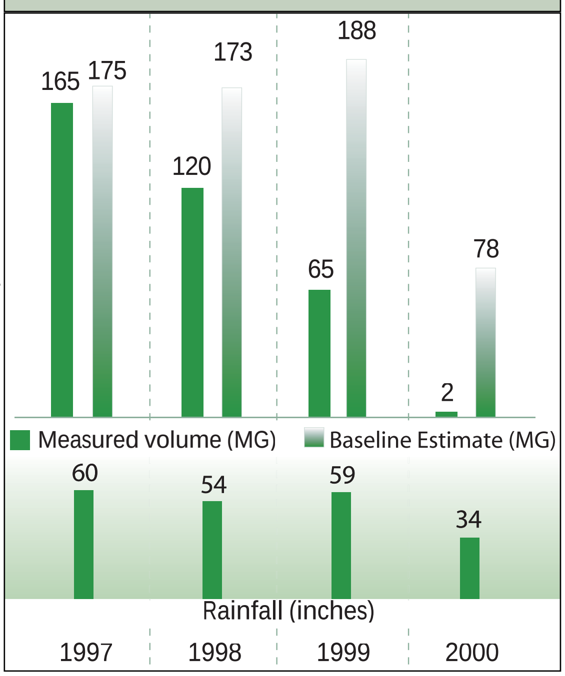
- To achieve a 95 percent reduction in CSO flows by 2003, subject to extraordinary events and extreme year anomalies.
- To accelerate the CSO reduction schedule to achieve the goal of one overflow per year or less at each outfall by December 2008.
- To pay for a Financial Feasibility Study if schedule modifications become necessary.

In November 2000, a second citizens group issued a notice of intent to file suit against the city for failure to meet the requirements of the Consent Decree.

Results

Bremerton has eliminated three CSO outfalls. As shown, the city's efforts have reduced CSO volume by 69 percent from baseline conditions (City of Bremerton, 1999). The city also reduced the annual number of overflow events by 56 percent. In 2000, the City achieved a 96 percent reduction in volume, and an 89 percent reduction in frequency of overflow events. Nine of 16 CSO outfalls overflowed only once or did not overflow at all in 2000 (Bertiaume, 2000). Some of the reduction can be attributed to the unusually low rainfall (20 inches less than normal). However, Bremerton believes it is on the way to achieving a goal of one overflow or less per outfall on an annual basis.

Annual CSO Volume and Rainfall



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Number of CSO Outfalls

20 (originally)
11 (currently)

Combined Sewer Service Area

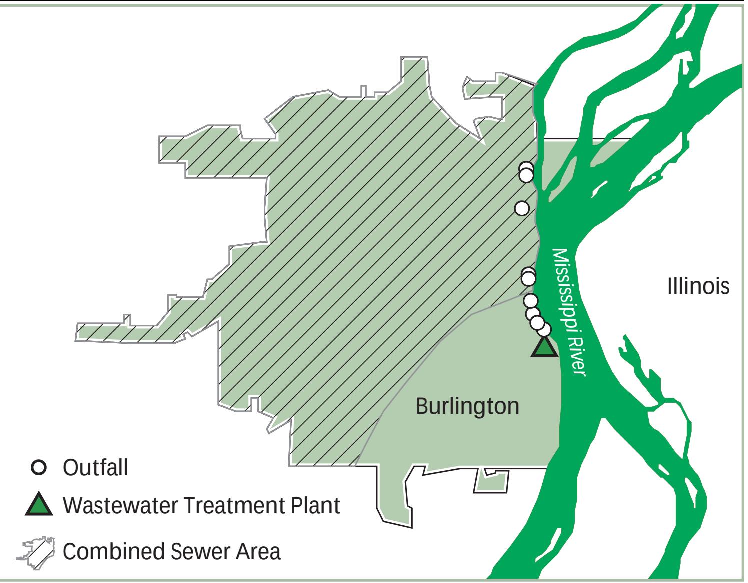
2.9 square miles

Wastewater Treatment Capacity

18 mgd

Receiving Water(s)

Mississippi River



Controls

- Burlington has been separating portions of its CSS since the 1970s through major street reconstruction projects.
- Work on eliminating individual CSOs started in 1982.
- As part of a 1996 CSO study, a number of CSO control alternatives were evaluated, but the city decided to continue to pursue sewer separation.

Photo: Great River Bridge over the Mississippi River in Burlington.
Courtesy of Hawkeye Magazine

Program Highlights

- CSO outfalls have been reduced from 20 to 11.
- Burlington developed a plan to eliminate CSO discharges with sewer separation that will be completed by 2017.
- Burlington has merged a wide array of television inspection and existing sewer system information in a common, detailed data base to facilitate inspection and reporting.

Background on Burlington CSOs

Burlington, Iowa is a hilly city located on the banks of the Mississippi River with a population of 27,500. The city's sewer system is a mix of sanitary, storm, and combined sewers. Combined sewers were commonly constructed until the 1960s and primarily serve the downtown area. Downtown Burlington is the largest retail center in Southeast Iowa containing more than 75 shops and restaurants.

The sewer system serves 5,250 acres through 135 miles of sewers, and has 10,451 customer connections. Six sewersheds and 1,870 acres (36 percent of the sewer system) are served by combined sewers. The Hawkeye basin comprises two thirds of the city's sewer system and 18.5 percent (664 acres) of the drainage area is combined. The South and Market Street sewersheds, the next largest in size (493 and 273 acres respectively), are 100 percent combined. The Cascade sewershed is the next largest at 318 acres, and 32 percent (102 acres) combined. The Angular and Locust sewersheds represent 273 and 65 acres of combined sewers, respectively. Four other minor sewersheds, the Silver, Gnahn, Osborn, and Harrison, serve a combined area of 91 acres.

Burlington operates an activated sludge wastewater treatment plant with an average design flow of 9.0 mgd and a peak flow capacity of 18.0 mgd. The city has worked on eliminating CSOs through separation and has reduced CSO outfalls from 20 to 11. The wastewater treatment plant and the remaining CSOs discharge to the Mississippi River. The Iowa Department of Natural Resources (DNR) has designated this stretch of the Mississippi for primary contact recreation (Class A) and as a significant resource warm water (Class B- WW) .

Status of Implementation

The DNR's "Special Conditions for CSOs" requires that the city: (1) determine the hydraulic capacity of the sewers between the CSO and the wastewater treatment plant; and (2) develop an operational plan for the combined system. Burlington has adopted a long-range goal of separating the combined sewer systems to comply with DNR and EPA requirements. The City has separated storm and sanitary sewers on major street reconstruction projects since the 1970s. Implementing the long-range goal will extend through 2017 because of the significant cost to completely separate the sewer system.

Burlington eliminated five CSOs through sewer separation projects between 1982 and 1993. In 1993, the City submitted the *Report of Combined Sewer Overflows: Part 1* to the DNR (City of Burlington, 1993). The City concluded that the capacity of the sewers was adequate for current average dry weather flows, except for the Hawkeye sewershed. Anticipated development in the Hawkeye sewershed, combined with significant inflow from Hawkeye Creek and an unnamed tributary, was predicted to exceed the capacity of that system, which was calculated to be 15.4 mgd. Burlington also identified dry weather overflows at three locations.

In 1995, the city submitted the *Report of Combined Sewer Overflows: Part 2* to the DNR (City of Burlington, 1995). This report addressed NMC activities that are described in the following summary. The city identified a number of repairs to the sewer system and CSO outfalls, located a number of dry weather overflows and CSOs for elimination, and found a previously unknown CSO at a lift station.

NMC	Activity
Proper O&M	Clean, inspect, monitor flows. Conduct regular inspections by wastewater treatment plant personnel after every rainfall event.
Maximize collection system storage	Raise dam heights. Disconnect all roof drains and smoke test entire collection system to locate unnecessary sources of inflow.
Review pretreatment requirements	Develop storm water management plans to control storm water from new development sites.
Maximize flow to POTW	Raise dam heights to increase flow.
Prohibit CSO during dry weather	Replace pipe at CSO 016. Separate 26 acres at Gnahn and Osborn.
Control solids and floatables	Study alternatives once data are available.
Pollution prevention	Institute a recycling program.
Public notification	Publish results of CSO monitoring in the newspaper.
Monitoring	Install monitoring at seven active CSOs to measure number of activations, quantity of water discharged, water quality, and notify wastewater treatment plant personnel.

Burlington prepared a 20-year CSO Control Plan in 1996. This plan outlines a 20-year capital improvement program, describes the condition of the sewers, provides flow monitoring information, and analyzes potential flow conditions during a standard storm (5-year, 1-hour event, 2 inches of rain). A number of CSO control alternatives were evaluated. Inlet control storage, in-line storage, off-line storage, deep tunnel storage, and swirl concentrators/disinfection were eliminated due to ineffectiveness or cost. The City elected to use separation as the primary means of CSO control, and established six phases to be implemented by 2017. The schedule and costs associated with each phase is summarized below.

Phases and Outfalls Addressed	Schedule	Cost
1. Modify CSO and sewers, separate combined areas, and conduct inspections and eliminate improper private connections (eliminate eight CSOs; modify five others).	1996	$ 1.5 million
2. Separate the Hawkeye sewershed (eliminate one CSO).	1998 to 2002	$13.3 million
3. Separate the Cascade CSS (eliminate two CSOs).	2003	$ 3.1 million
4. Separate the Locust, Harrison, and South sewersheds (eliminate one CSO).	2003 to 2007	$ 5.0 million
5. Separate the Angular sewershed (eliminate one CSO).	2008 to 2012	$ 4.9 million
6. Separate the Market sewershed (eliminate 012) (eliminate one CSO).	2013 to 2017	$ 7.3 million
Total Cost		**$35.1million**

Many of the Phase 1 controls were completed in 1996. Work on Phase 2, the Hawkeye Sewer Separation Project, began in early 1999. The Hawkeye Project has three parts and is expected to take five years to complete. Part 1 of the Hawkeye project includes studying the system (flow monitoring, manhole inspection, smoke testing, dyed water flooding, line cleaning and television inspection) to identify sewer capacities and proper sizing of sanitary trunk lines, and to identify sources of unknown inflow such as roof drain, back yard inlets, etc. Burlington used this opportunity to develop an innovative approach to sewer television inspection and reporting, where the information collected on the sewer system was delivered on digital video discs (DVD). A wide array of television inspection and existing information on the sewer system was merged into a common, detailed data base management system. This approach saved time in collecting, annotating, analyzing and reviewing information as well as providing permanent records with a design life of at least 100 years (Carhoff, 2000). These data are also being entered into a county-wide GIS that should be available in 2002.

Part 2 of the Hawkeye Project consists of separating storm water inlets. The city intends to implement a storm water management plan for each of the main trunks entering the Hawkeye sewer. Part 3 consists of installing sanitary trunk sewers into the Hawkeye trunk sewer to convey sanitary flow to the wastewater treatment plant. Storm water will be conveyed in the existing trunk sewer to local receiving waters.

After the Hawkeye Project is completed, the city will reevaluate the 20-year plan. Separation will continue to the maximum extent possible, and the city will consider using innovative end-of-pipe treatment technologies to address remaining overflows.

Costs, Financing and Results

Burlington used a mix of Community Development Block Grants, federal grants, and bonds to finance CSO control. Prior to the initiation of the Hawkeye project, the city spent more than $2.9 million to separate sewers within 464 acres of the service area and to eliminate five CSOs.

The Hawkeye Sewer Separation Project is a $13.3 million project, where 82 percent of the budget will fund sewer construction, 13 percent inspection and smoke testing, and the remaining 5 percent repairs to the trunk sewers. In 1998, the city was awarded a federal special infrastructure grant for $7 million. The city is providing the local cost-share through bond issuance and user fees. When complete, the Hawkeye Sewer Separation Project should eliminate 60 overflows per year and 1.5 mgd of CSO discharged to the Mississippi River.

The city is facing an additional $20.3 million cost to implement the remainder of the 20-year CSO Control Plan and is seeking a grant to support this completion. The 20-year implementation schedule and financing for the plan are both critical issues for Burlington. Many of the residents are on fixed incomes or earning low wages, and cannot afford increased sewer rates. Federal grant funding is therefore a key component of the city's LTCP.

References

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City of Burlington, Iowa. 1995. *Report of Combined Sewer Overflows: Part 2*. City of Burlington, Burlington, IA.

Community Case Study — Chicago, IL—Region 5

Number of CSO Outfalls

408

Combined Sewer Service Area

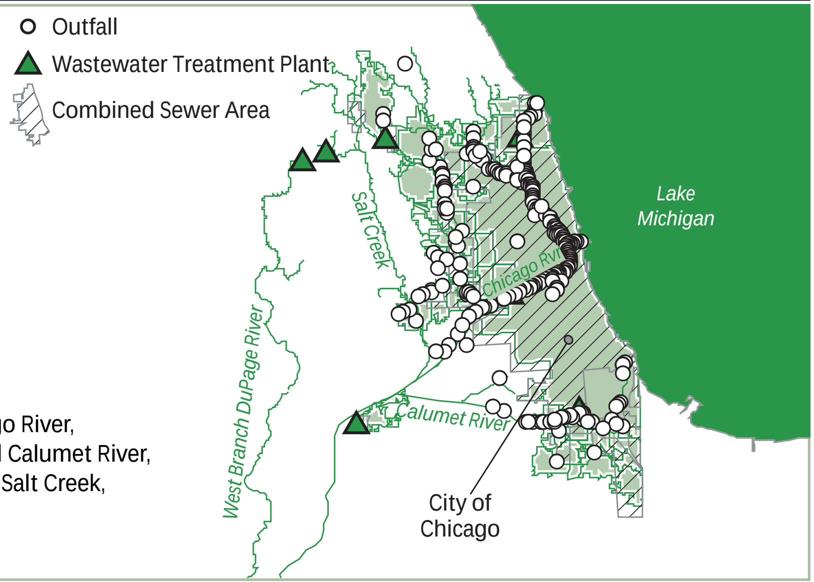
375 square miles

Wastewater Treatment Capacity

2,434 mgd (secondary)

Receiving Water(s)

Addison Creek, Calumet River, Calumet Sag Channel, Chicago River, Chicago Ship Channel, Des Plaines River, Flagg Creek, Grand Calumet River, Little Calumet River, North Shore Channel, Oak Lawn Creek, Salt Creek, San & Ship Canal, Weller's Creek



Controls

- Large diameter, deep rock tunnels are used to capture, convey, and store wet weather flows.
- Reservoirs are currently being constructed to provide flood control and additional CSO control benefits.

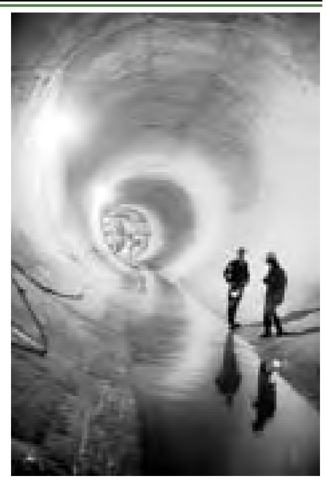


Photo: New deep rock tunnel, part of Chicago's extensive Tunnel and Reservoir Plan (TARP).
Courtesy of MWRDGC

Program Highlights

- Construction of CSO control projects began in 1975.
- As of 2000, 93% of all CSO outfalls have been intercepted by TARP.
- To date, TARP tunnels have captured and facilitated the treatment of more than 565 billion gallons of CSOs.

Background on Chicago CSOs

CSOs and CSO control are a complex regional issue in the greater Chicago metropolitan area where there are a total of 408 CSOs along 81 miles of waterways. The majority of the outfalls are regulated through NPDES permits issued to 52 municipal jurisdictions, including the City of Chicago. The Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) maintains regional treatment facilities and has responsibility for outfalls near the plants and along the interceptors. The MWRDGC combined sewer service area comprises 375 square miles and serves a population of over 3 million. It is estimated that there are over 5,000 miles of sewers within the combined sewer area. The rated treatment capacities of the seven MWRDGC water reclamation plants (WRPs) are:

WRP	Design Average Flow (mgd)	Design Maximum Flow (mgd)
Stickney	1,200	1,440
North Side	333	450
Calumet	354	430
Kirie	52	110
Egan	30	50
Hanover Park	12	22
Lemont	2	4
Total	**1,983**	**2,506**

Status of Implementation

MWRDGC is implementing a two-phased approach to address CSO and flood control known as the Tunnel and Reservoir Plan, or TARP. The construction of large diameter, deep rock tunnels for the storage of combined sewage is the centerpiece of TARP Phase I. The construction of reservoirs to primarily address flooding issues is the main component of TARP Phase II.

TARP Phase I is the MWRDGC's LTCP. TARP Phase I captures, conveys, and stores wet weather combined sewer flows in excess of interceptor capacity until they can be pumped out to existing WRPs for full advanced secondary treatment when plant capacity becomes available following storms. TARP Phase I consists of 109.4 miles of tunnels 9 to 33 feet in diameter, three tunnel dewatering pumping stations, over 250 drop shafts, and over 600 associated near-surface connecting and flow regulating structures. CSOs are intercepted at all outfalls. The system is designed to facilitate capture and treatment of the CSO first flush from all storms, and all of the CSO from the smaller, more frequent storms. This equates to a reduction of approximately 84 percent of the pollution load. Reservoirs being built under TARP Phase II are primarily intended for flood control and are not part of the LTCP, although they will provide additional CSO pollution control benefits.

TARP was developed through a joint effort of the State of Illinois, Cook County, the City of Chicago, and the MWRDGC. It represents a hybrid of the best eight of over 50 water management plans proposed and studied beginning in the mid-1960s. TARP has been designed to protect Lake Michigan and Chicago-area waterways from CSO pollution, and to significantly reduce local basement flooding. Officially adopted by the MWRDGC in 1972 with construction beginning in 1975, TARP was the first comprehensive Clean Water Act CSO control plan developed for a major metropolitan area.

The design for TARP is based on the presumption approach. The storage tunnels built under Phase I are designed to pick up all 408 CSOs within the service area, but were designed to work with the reservoir system, which is not yet complete. The result has been that when multiple storm events occur within a short period of time, the storage tunnels sometimes do not drain completely, producing short-term capacity reductions. Since the CSOs serve as CSS emergency relief points, TARP has cautioned all 52 member cities and villages not to disconnect their outfalls unless they feel confident their local sewer systems are adequate to handle wet weather flows without surcharging that may lead to street or basement flooding.

Approximately 75 TARP Phase I construction contracts have been completed, with only two remaining. As of September 2001, 93.4 miles of tunnel system were complete and in operation, 8.1 miles of tunnel were under construction, and 7.9 miles of tunnel were expected to be under construction by late 2001. Of the 2.3 billion gallons of CSO storage tunnel capacity, 2.1 billion gallons (92 percent) are online. Phase II, reservoir construction, is not as far advanced. A summary of TARP progress follows.

Tunnels and Related Facilities (Phase I)

System	Construction Costs	Miles Total	Miles Complete
Mainstream	$1,142	40.5	40.5
Calumet	$711	36.7	20.7
O'Hare	$64	6.6	6.6
Des Plaines	$469	25.6	25.6
Total	**$2,386**	**109.4**	**93.4**

Reservoirs (Phase II)

System	Construction Costs	Capacity Total (Billion Gallons)	Capacity Complete (Billion Gallons)
McCook	$521	10.5	0
Thornton	$105	4.8	0
O'Hare	$48	0.4	0.4
Total	**$674**	**15.7**	**0.4**

There are no dry weather overflows in the service area. The potential for dry weather flow is greatly reduced by a number of factors including:

- The inherent design of the sewer system.
- Infiltration and inflow (I/I) control programs implemented in separate sewer areas in local villages and cities upstream of the combined sewer area.
- MWRDGC 's sewer construction permit programs governing sewer connections tributary to its interceptors and treatment plants.
- MWRDGC's own O&M programs and sewer rehabilitation efforts on its 550-mile interceptor sewer system.

Costs and Financing

TARP Phase I construction progress has been continuous since beginning in 1975. Construction contracts totaling more than 2.2 billion dollars of the budgeted $2.4 billion have already been spent (91 percent). Annual O&M costs between1997 and 1999 averaged $8.1 million per year. The construction cost for the final TARP Phase I tunnel (the Little Calumet Leg Tunnel) is estimated to cost $160 million.

Early federal and state construction grants greatly reduced the MWRDGC's direct cost-share for the project. After cessation of the federal construction grants program, the MWRDGC committed itself to completing TARP exclusively utilizing its own funding resources. However, due to the large costs involved, funding availability has been the primary reason that construction has not progressed faster.

TARP's large scope, high implementation cost, and unique, untested nature has sparked hot debate and heavy news media coverage, including a segment on CBS' "60 Minutes". While evaluated as being the most cost-effective solution, TARP opponents offered alternatives they believed to be cheaper and as effective. Other solutions were proposed including smaller scale decentralized facilities, roof-top and street storage, park storage, sewer restrictions, relief sewers, downspout disconnection, and basement sewer backup prevention devices. All suggestions were evaluated, and it was found that none of the TARP alternatives would achieve the stated goals.

After $739 million in TARP construction contracts had been awarded (75 percent federally funded) in 1979, the United States General Accounting Office (GAO) issued a report, *Combined Sewer Flooding and Pollution—A National Problem: The Search for Solutions in Chicago* (GAO, 1979). This report analyzed TARP's cost versus it's objectives. A conclusion was in the form of a question: "Both phases of TARP and associated projects offer a promising solution to the (CSO) problem. But can the country afford it?" The GAO recommended ceasing further federal funding of TARP until a reassessment was made to see if less costly alternatives existed, and to consider adopting more flexible water quality goals for the waterways affected by CSOs. The MWRDGC and local political leadership vigorously objected to both recommendations and to GAO's estimate of TARP's cost, which was three to four times higher than the MWRDGC's estimated cost. More studies were conducted and TARP was reaffirmed as the most cost-effective alternative.

Water Quality Issues

MWRDGC conducts several water quality monitoring programs in the Chicago and Calumet waterway systems. Water quality samples are taken on a weekly basis for general chemistry and metals. In addition, dissolved oxygen monitoring is conducted on a continuous basis with in-place monitors. MWRDGC also conducts fish population surveys to track changes in the numbers of fish and fish species present in waterways. The results of these studies have documented dramatic improvement in water quality. MWRDGC believes that the completion of TARP Phase I (its LTCP) will result in compliance with the water quality standards.

By letter dated June 28, 1995, the State of Illinois Environmental Protection Agency concurred with the MWRDGC advising that "the Agency believes that the completion of TARP will be adequate to meet water quality standards and protect the designated used of the receiving waters pursuant to Section I.C of the CSO Control Policy.

Results

TARP tunnel fill levels and pumpout are measured to determine total CSO capture during storm events. Major portions of the TARP tunnel system were placed in operation beginning in the mid 1980s, with new segments coming on-line afterwards. To date, the 93.4 miles of completed TARP tunnels have captured and facilitated treatment of over 565 billion gallons of first and second flush combined sewage that would have otherwise spilled to local rivers and streams.

The frequency of CSO occurrences has decreased from nearly 100 times per year to less than 15 times per year.

Marked visible improvement in the condition of waterways has spurred recreational and other uses of the Chicago River including tourism and sightseeing, boating, canoeing, and fishing. Once perceived by many as a virtual open sewer, the river system has been cleaned up by TARP. This has brought about enhanced real estate values and booming riverside development, including hotels, office/apartment buildings, restaurants, riverwalks, marinas, and canoe/kayak launches. Fish, including various species of game fish, and other aquatic wildlife, have returned to the river system in dramatic numbers. The year 2000 Bassmaster Fishing Tournament was held in Chicago on its restored waterways.

TARP has received much recognition and numerous awards from government agencies and technical/professional organizations for its innovative and effective design and performance. The project has garnered favorable press from local media for its performance, and much local support from local villages and cities.

References

GAO, 1979. *Combined Sewer Flooding and Pollution—A National Problem: The Search for Solutions in Chicago,* CED 79-77. Washington, DC.

MWRDGC, 1998. *Report No. 98-23: Water Quality Improvements in the Chicago and Calumet Waterways Between 1975 and 1993 Associated with the Operation of Water Reclamation Plants, the Tunnel and Reservoir System, and Instream and Sidestream Aeration Stations*. Chicago, IL.

Community Case Study — Columbus, GA—Region 4

Number of CSO Outfalls

16

Combined Sewer Service Area

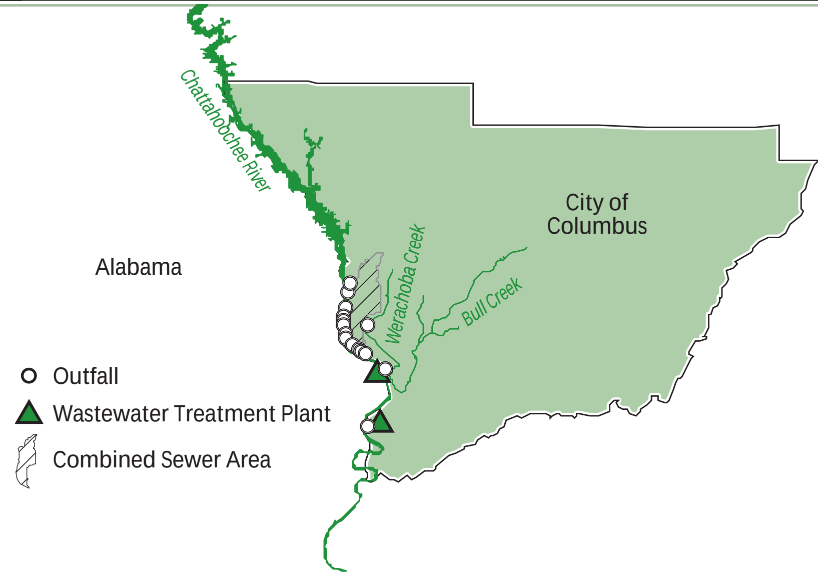
4.1 square miles

Wastewater Treatment Capacity

42 mgd (secondary)

Receiving Water(s)

Chattahoochee River



Controls

- Two water resources facilities (WRFs) provide direct treatment of CSOs. One WRF is a national demonstration facility used to evaluate alternative technologies to remove CSO contaminants and provide environmentally sensitive disinfection. Technologies evaluated include flow controls, screening, grit handling, vortex separation, compressed media filtration, UV disinfection, chlorination and dechlorination, and other disinfection methods. The other WRF provides CSO pumping, screening, vortex separation with chlorine disinfection, grit handling, and residuals disposal.

Vortex separation facility under construction.
Courtesy of Columbus Water Works.

- A strategically placed sanitary relief line is used to transport half of the sanitary sewage to the wastewater treatment plant, outside the bounds of the CSS.
- Remaining CSO discharges have been relocated downstream of public access areas.

Program Highlights

- Columbus' CSO program has been fully implemented. Compliance monitoring and performance testing continue.
- The Chattahoochee River now meets water quality standards for all criteria including bacteria.
- An extensive public education program involving numerous public hearings, news articles, water bill flyers, watershed workshops, and seminars was a key component of the development and implementation of the LTCP.

Background on Columbus, GA CSOs

The Columbus CSS extends over 2,600 acres of the old downtown area draining to the Chattahoochee River. Until controls were implemented, there were 5,200 acres of combined sewer with 16 CSO outfalls to the river. The average annual river flow is 6,500 cfs, with a flow of 3,500 cfs on average in summer and a regulated low flow of 1,160 cfs. Prior to CSO control, elevated levels of fecal coliform bacteria and visible sewage debris often plagued the Chattahoochee. Columbus began to implement CSO controls in 1995, including two water resources facilities (WRFs). One of the WRFs, in Uptown Park, also serves as a CSO technology testing facility.

Status of Implementation

The Columbus Water Works (CWW) has fully implemented an LTCP based on the demonstration approach of the CSO Control Policy. The LTCP was implemented by December 31, 1995, in compliance with Georgia State law. The Columbus program included characterization of the system and receiving water impacts, implementation of the NMC, pilot testing of alternative technologies, long-term planning, structural controls, and post-construction monitoring to demonstrate compliance with water quality standards.

Program development activities culminated in a $95 million capital program that included:

- Municipal treatment plant upgrades
- Sewer separation
- Diversion structure
- Collector and transport conduits
- Pumping stations
- Two CSO treatment facilities (WRFs)
- Associated river walk, trail and parks
- Five-year technology demonstration testing

The technology demonstration part of the program evaluated technologies for pollutant removal (including screening, vortex separation, filtration processes, flow controls) and several disinfection methods (including ultraviolet light, sodium hypochlorite, paracetic acid and chlorine dioxide). Sodium bisulfite dechlorination was also evaluated for dechlorination (Boner, 2001). Sewer separation was focused mainly in the upstream catchments where this type of solution made economic sense or had a high benefit-to-cost ratio. One strategically placed sanitary relief line eliminated half of the sanitary sewage that entered the CSS.

System Characterization

Columbus began its sampling program in 1990 and has continued the monitoring of area streams, rivers, and municipal infrastructure since then. From 1990 to 1993 the city conducted wet weather sampling of CSOs, streams, rivers and pilot facilities constructed to evaluate alternative CSO treatment technologies. CWW subsequently conducted two national demonstration programs to evaluate CSO controls. These programs included 38 monitoring stations on streams, river, and CSO control facilities including individual process components.

A wet weather monitoring program has been the focal point of Columbus' effort to understand wet weather pollution, its impact on the environment, and cost-effective means to control and reduce the problem. Watershed monitoring stations included flow measurement, automatic sampling and multi-parameter continuous-probe measurements. Analytical tests included *E. Coli* and fecal coliform bacteria, cryptosporidium and giardia, suspended solids and particle distribution, oxygen demands, nutrients and metals. Probe measurements included dissolved oxygen, turbidity, pH, temperature, and conductivity. Aquatic biology and habitat measurements in over 30 locations were monitored on a quarterly and/or biannual schedule to assess macroinvertebrates and fish populations over a two-year period. Monitoring was conducted to:

- Quantify CSO pollutant loadings
- Measure watershed health and impacts of wet weather pollution
- Determine performance of the various technologies tested

- Calibrate the EPA BASINS model
- Develop a framework for area TMDLs
- Show compliance with the CSO Control Policy for the controls implemented

Characterization findings show that all of these objectives were achieved, and that several protocols for monitoring and modeling have significant national benefit. The CWW monitoring, modeling and technology performance testing was peer reviewed by the Water Environment Research Foundation.

Nine Minimum Controls

In concert with the CSO Control Policy development, CWW evaluated the optimization of its system and organization together with its long-term planning to address NMC requirements. The NMC were identified for the Columbus system, implemented, and documented in a June 1995 report to the Georgia Department of Natural Resources - Environmental Protection Division, the NPDES permitting authority.

The system has been surveyed and hydraulically modeled, and there are no dry weather sewer overflows.

An extensive public education program involving public hearings, news articles, water bill flyers, watershed workshops, and university seminars has been conducted during the planning, implementation, and subsequent testing phases of the CWW CSO program. A continued program is being provided through CWW activities and support of organizations such as Leadership Columbus, the Oxbow Environmental Learning Center, Adopt-A-Stream, and River Kids.

Long Term Control Plan

Columbus developed its LTCP based on the demonstration approach of the CSO Control Policy. Demonstration requires that remaining CSOs after implementation of controls must not preclude the attainment of water quality standards or contribute to water quality impairment. In Columbus, this determination is made through a TMDL allocation process. Columbus was able to quantify pollutant contributions and link the source and the ability to attain water quality standards to water quality targets. This analysis led to a level of CSO control beyond which there is no "reasonable potential to cause or contribute to exceedances of water quality standards." The result was a post-construction Phase II CSO NPDES Permit that had no numeric limits other than "performance standards based on average design conditions and consistent with the facilities implemented and demonstrated." Columbus continues to monitor the receiving water and CSO effluent. The data are aggregated with the calibrated BASINS model output to demonstrate on a periodic basis (monthly if possible) that the source contributions and comparison with ambient monitoring data add to the database supporting the TMDL allocation process.

Costs and Financing

Funds for the initial assessment studies, design and early construction were obtained through revenue bonds. To obtain the necessary additional funds, the issue was taken to the public through a series of hearings, workshops and through other outreach vehicles. Incorporating the river walk and park amenities into the project played a key role in drawing public interest to the river and the need for water quality and human health protection. An environmental learning center supported by CWW was created through a partnership with the Columbus State University. The center has since become the focal point for community discussions on environmental resources and municipal infrastructure issues.

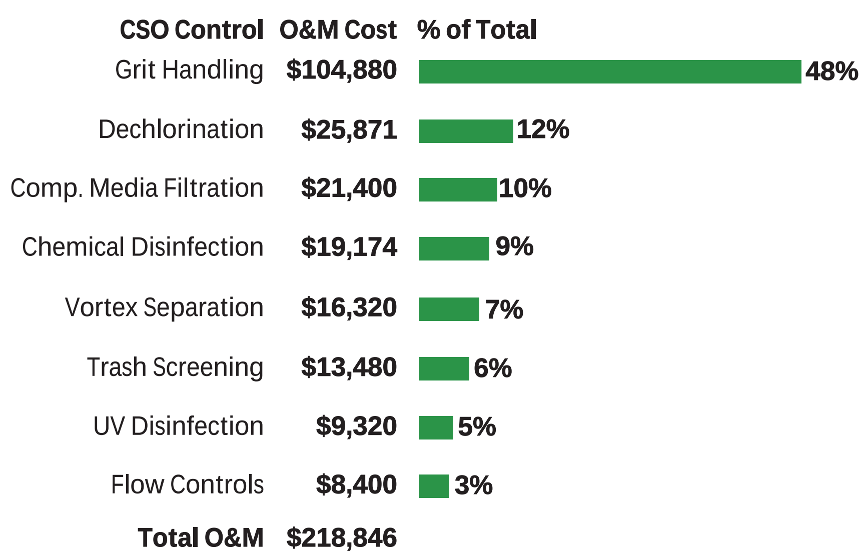
CWW furthered its public involvement by developing alternative financing methods including a special options sales tax (SPLOST), Ad Valorem tax, water and sewer rate increases, and a user fee approach. The SPLOST approach was put before public vote and won. The net result was that the facilities were paid in full shortly after the construction was completed. This reduced the potential water rate user costs by eliminating the long-term indebtedness and interest that normally accompanies municipal infrastructure projects.

Capital costs for the CSO program are delineated in the table below. The total capital expenditure of $95 million is based upon 1995 completed construction cost. Sewer separation costs amounted to $15,000 per acre. The municipal treatment cost component is not included in the $95 million CSO program because it serves other purposes in addition to CSO, but enables compliance with the NMC by maximizing flow to the wastewater treatment plant, or POTW.

CSO Program Element	1995 Construction Cost
Municipal Treatment	$8,500,000
Sewer Separation	$5,100,000
Transport Systems	$43,359,593
Uptown Park WRF	$22,711,160
South Commons WRF	$22,126,000
Technology Demonstrations	$1,736,000
Total	**$95,000,000**

The CWW has an annual CSO operating budget of $1 million which includes labor, power, chemicals, spare parts, materials and equipment replacement. Capital and operating costs by process for the Uptown Park WRF are shown in the tables below. The

CWW Annual Operations and Maintenance



major capital costs are in the structural components. The dominant operating costs are associated with grit handling and removal.

CWW Capital Costs

CSO Control	Capital Cost	% of Total
Vortex Separation	$4.8 million	40%
Trash Screening	$2.4 million	20%
Comp. Media Filtration	$1.2 million	10%
UV Disinfection	$1.2 million	10%
Flow Controls	$1.2 million	10%
Grit Handling	$0.7 million	6%
Dechlorination	$0.2 million	2%
Chemical Disinfection	$0.2 million	2%
Total Capital Cost	**$12.0 million**	

Water Quality Issues

Water quality and beneficial use improvements have been the direct result of the CSO control program in Columbus. The Chattahoochee River now meets water quality standards for all criteria including bacteria. The river, especially in the downtown area and location of the CSOs, is aesthetically free of trash, oil and grease and other sewage debris. The old CSO outfalls are no longer visible.

Enforcement Issues

Georgia Law enacted in 1990, and amended in 1991, required five CSO cities in the state to eliminate or control their CSO problem to meet water quality standards by December 31, 1995. The CWW was placed under a CSO NPDES Permit, issued March 31, 1992, and accompanied by an Administrative Order requiring implementation of planning, design and construction of control facilities. The permit also required regular monitoring and reporting of discharges from the existing CSOs. CWW completed all requirements of this permit and Order ahead of schedule.

In 1997 and 1998, the NPDES permit renewal was negotiated with the benefit of having two years of operational and monitoring data of the CSOs, the river, and a start of a calibrated EPA BASINS model of the urban watershed. The negotiated CSO permit is considered a post-Phase II permit with regard to the CSO Control Policy. The permit requires that the facilities be operated in accordance with the demonstrated CSO program. The permit requires monitoring of the facility discharges and receiving water. The results are reported in a mass balance spreadsheet that allows the comparison of the accumulated source contributions and the downstream measurements.

Results

The Columbus CSO program is fully implemented. Compliance monitoring and performance testing continues. Columbus has plans to implement an integrated real-time monitoring network that will collect and manage the data for compliance reporting, measure watershed restoration progress, and provide early warning of watershed disturbances for drinking water protection. The monitoring network will include urban area creeks and river, CSOs and treatment plants. Watershed characterization data including near real-time displays will be available to the public via the internet.

Performance testing at the Uptown Park WRF has generated the data necessary to evaluate combinations of the technologies tested. The alternative evaluation process considered the annual distribution of rainfall and runoff events such that annual yields (quantity per acre per year) and the reduction in yield can be assessed versus the cost for the treatment scenario. The costs and benefits for different treatment levels provided by technologies demonstrated in Columbus were also evaluated. For example, the capital cost per pound of total suspended solids removal increased from $27 per pound at the 63 percent removal rate to $63 per pound at the 80 percent removal rate.

A new bromine-based chemical is being tested with potential for higher treatment rate capabilities with minimal residuals. This technology evaluation is being undertaken through a collaboration of the Georgia Institute of Technology, the chemical manufacturer, and CWW. It is anticipated that other partnerships will be generated to evaluate various CSO technologies at the Uptown Park WRF.

Pollutant	Removal as % of Annual Load
BOD	55—61%
TSS	52—62%
Fecal coliform	95—99%
Copper	66—75%
Lead	62—83%
Zinc	62—82%

The primary goal of the Columbus CSO control program was to reduce fecal coliform bacteria to levels meeting water quality standards in the Chattahoochee River. Watershed measurements and a TMDL formulation were required to make this determination. Area watersheds were monitored over a three-year period and the BASINS model was calibrated from the measured data. The results of this evaluation show that the CSOs do not cause or contribute to water quality standards violations. As shown in the table at right, the fecal coliform removal rate was extremely successful, but other pollutants of concern were also significantly reduced.

The 30-day geometric mean fecal coliform represents all contributing sources and is well within the summer and winter water quality criteria of 500 and 1,000 colonies per 100 ml. The maximum daily standard of 4,000 colonies per 100 ml was exceeded periodically (a few days within a two-year period), but was attributed to urban and suburban streams that discharge to the river. Remaining bacteria attributable to CSO after treatment is a small fraction of that contributed by the urban and rural watersheds.

The next challenge for the area is to implement management strategies that will focus on urban watershed protection including area drinking water supplies. In accomplishing these goals, policies and ordinances will be developed and watershed technologies will be demonstrated. Ultimately site-specific criteria defining water body use and protective measures will be developed. The regional and local partnerships and the environmental education network established by CWW will continue to be the focal point of these efforts.

Most of the future needs for Columbus will be associated with storm water controls. The costs of urban watershed management could be very large and demand a sound-science approach to test alternative technology. Columbus has initiated several projects to evaluate wet weather control strategies in which performance results will be applied on a broader basis to quantify costs and benefits of watershed restoration.

Citations

Boner, Mark. Wet Weather Engineering and Technology (WWETCO), Columbus, GA. Personal communication with Limno-Tech, Inc. staff on details of the combined sewer overflow plan and program. Summer 2001.

Community Case Study

Louisville, KY—Region 4

Number of CSO Outfalls

115

Combined Sewer Service Area

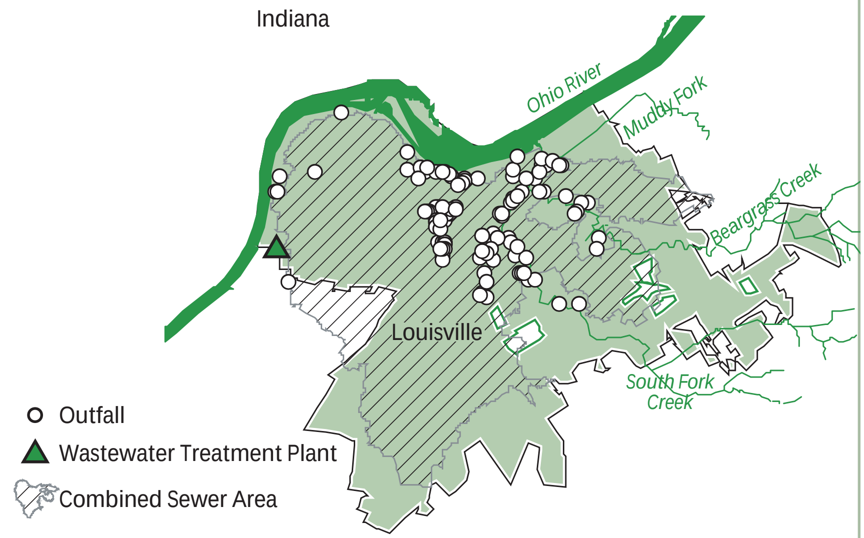
375 square miles

Wastewater Treatment Capacity

250 mgd (primary)
140 mgd (secondary)

Receiving Water(s)

Ohio River



Controls

- The Louisville and Jefferson County Metropolitan Sewer District (LJCMSD) has initiated in-line storage projects, separation projects, storage basin projects, and pilot CSO treatment projects.
- LJCMSD is currently working to expand wet weather capacity at its treatment plant by 40 percent, from 250 to 350 mgd.

Photo: Inflatable dam at the Sneads Branch CSO.
Courtesy of LJCMSD

Program Highlights

- Five CSO outfalls have been eliminated.
- CSO frequency has been reduced by 27 percent and CSO volume has been reduced by 13 percent. This keeps 681 million gallons per year of combined sewage out of local receiving waters.
- LJCMSD's program to install backflow prevention devices in homes to eliminate sewer backups has been used as a national model.

Background on Louisville CSOs

The Louisville and Jefferson County Metropolitan Sewer District (LJCMSD) provides sewer service as well as storm water utility management to the Louisville, Kentucky community. The sewer customer base is just over 198,000 and has grown at a rate of 12 percent over the past five years. Sewer service is provided by a combination of separate sanitary sewers and combined sewers. The total length of sewers within the service area is over 3,000 miles including 680 miles of combined sewers built before 1995. The combined sewer service area is heavily urbanized and covers approximately 24,000 acres. There are currently a total of 115 CSO outfalls within the CSS.

Wastewater flow is treated at the Morris Forman Wastewater Treatment Plant (MFWTP). MFWTP is capable of providing full secondary treatment for up to 140 mgd and primary treatment for an additional 110 mgd during wet weather periods. A project is currently underway which will increase the wet weather primary treatment capacity from 250 mgd to 350 mgd.

Status of Implementation

Nine Minimum Controls

All of the NMC have been implemented, and LJCMSD provided NMC documentation to the State of Kentucky. Many of the NMC activities were being implemented by LJCMSD before the CSO Control Policy was issued in 1994.

LJCMSD established a maintenance program in the 1980s to focus on inspection and maintenance of CSO outfalls. Each CSO outfall is inspected on a set schedule. The frequency of the inspection ranges from daily to monthly depending on the particular outfall size, history of the discharge, and past maintenance problems. Dry weather overflows have essentially been eliminated through regular maintenance activity.

Regularly scheduled cleaning of over 25,000 storm water catch basins in the CSS result in the removal of over 600 tons/year of street debris and litter. This program reduces pollutant discharge from CSOs and prevents plugging and dry weather blockages in the sewer system.

For notification of overflows, LJCMSD located signs at each CSO outfall to inform the public of the outfall and the reason for the outfall. The public is asked to call LJCMSD customer service if a dry weather overflow is occurring. During extreme wet weather events, LJCMSD purchases time on local radio stations to inform the public to stay out of the streams for safety reasons. LJCMSD's website (www.msdlouky.org) has additional information about CSOs and water quality.

Long Term Control Plan

LJCMSD developed a flow-monitoring program in 1991 to characterize the CSS. Flow monitors were installed at 50 locations throughout the CSS. This information was used to develop and calibrate a SWMM model to simulate the combined system. Long-term quality samplers are located at 12 overflow locations. Permanent real-time flow monitors are in place in three locations and additional locations are planned as part of real-time control projects.

LJCMSD has developed an LTCP as required by their NPDES permit and has been implementing the plan within five-year increments for which the LJCMSD Board can commit funding. The plan is dynamic. It will continue to evolve and improve based upon new data (water quality impacts, land uses), new technology, and emerging regulations. The LTCP has been submitted to the State of Kentucky. LJCMSD is working to implement the LTCP, although it has not yet been approved by the state.

The LTCP is based upon a mixture of the presumption and demonstration approaches described in the CSO Control Policy. The combined sewer area in Louisville is divided into three regions. CSO controls in Region 1 are based on the presumption approach, and CSO controls in Regions 2 and 3 are based on the demonstration approach. Region 1 discharges to streams, which in turn discharge to the Ohio River; Regions 2 and 3 discharge directly to the Ohio River.

LJCMSD has prioritized activities outlined in its LTCP so that controls for overflows impacting sensitive areas are implemented first. One key effort has been to address overflows in the most upstream areas of Region 1 that are located in a public park. The location of these outfalls increases the risk of the public coming in contact with CSO discharges and therefore the control of these CSOs has been given a high priority.

Costs

To date, LJCMSD has spent an estimated $25 million in implementing its LTCP. Full implementation will cost an estimated $210 million; this projection will be affected by the availability of funding for CSO control and the complexity of completing projects in fully urbanized areas.

LJCMSD is using its resources as efficiently as possible to implement the high priority control identified in its LTCP. The specific control measures outlined in the LTCP are continually reviewed in light of changing technology, improved understanding of the system, and the performance of controls that have been implemented. It should also be noted that LJCMSD has numerous programs that result in water quality improvements. LJCMSD attempts to allocate resources based on a combination of regulatory requirements, customer needs, and water quality benefits.

Water Quality Issues

Based on extensive and ongoing watershed monitoring, LJCMSD believes that, because of the impacts of heavy urbanization, meeting current water quality standards in many local CSO receiving waters will be difficult. In fact, LJCMSD believes that when the LTCP is fully implemented, water quality standards will not be attained. For example, fecal coliform standards will still be exceeded about 30% of the time. Meeting current water quality standards will require an integrated effort that addresses not only CSO discharges, but also other point and non-point discharges (including storm water and sanitary sewer overflows). To help prioritize and address the many programs, LJCMSD is initiating a "Water Quality Tool" computer program that will work to predict the benefits of various projects in specific watersheds and compare them. This "Tool" is being developed by merging the computer models HSPF and SWMM.

Enforcement Issues

LJCMSD has been aggressively addressing CSOs to improve water quality through O&M efforts as well as capital projects. Dry weather overflows have been virtually eliminated. Various capital projects to eliminate overflows have been completed along with two pilot projects to treat CSO discharges. The State of Kentucky has chosen, for now, to address CSO issues through the permitting program rather than through enforcement. Therefore, to date, no communities in Kentucky have been issued enforcement actions related to the development and implementation of CSO controls, as described in the CSO Control Policy.

Results

A range of projects have been successfully implemented to date. LJCMSD has initiated in-line storage projects, separation projects, storage basin projects, and pilot CSO treatment projects. These pilot treatment projects are being reviewed by both Water Environment Research Foundation and NSF International.

In an effort to address one of the key issues of CSOs – human contact - LJCMSD has been installing backflow prevention devices in the basements of homes to eliminate sewer backup from surcharged combined sewers. This program has become a national model with 5,100 homes protected to date.

LJCMSD has developed a county-wide geographic information system (GIS) to catalogue and track all aspects of the sewer system (i.e., pipe length, pipe type, etc). Upgrades will include condition ratings and other sewer operation and maintenance information. Work order tracking for operation and maintenance activities has recently been implemented. These attributes are recorded and attached to the infrastructure assets within the GIS.

Visual representation of reductions in average CSO volume and frequency for LJCMSD Regions 1, 2, and 3 and a system-wide description of pollutant load reductions are provided in the accompanying graphs. These numbers reflect the effect of the system improvements and form the basis for measuring the achieved reductions in overflow volumes and frequencies for each region and the CSS as a whole.

Based on system improvements implemented between July 1993 and July 1999:

- Five CSOs have been eliminated through various projects, including separation.
- Average annual CSO volume has been reduced from 5,153 million gallons per year to 4,472 million gallons per year, a reduction of 681 million gallons per year, or 13 percent.
- The frequency of CSO discharges was reduced from 5,361 overflows per year to 3,898, representing an overall reduction of 27 percent.
- CSO loads of biological oxygen demand were decreased from 3.2 million pounds to 2.9 million pounds per year, an overall decrease of eight percent.
- CSO loads of total suspended solids were decreased from 7.2 million pounds to 6.5 million pounds per year, an overall decrease of 10 percent.

LTCP storage projects now under construction will provide further reductions in CSO frequency, volume, and pollutant loading. Based on a system assessment, LJCMSD has also begun implementation of a real-time control project that will result in additional reductions in the next five years.

References

AMSA, 1994. *Approaches to Combined Sewer Overflow Program Development: A CSO Assessment Report*. AMSA, Washington D.C. November 1994.

Community Case Study — MWRA, Boston, MA—Region 1

Number of CSO Outfalls

84 (originally)
63 (currently)

Combined Sewer Service Area

14 square miles

Sewer Service Area

407 square miles

Wastewater Treatment Capacity

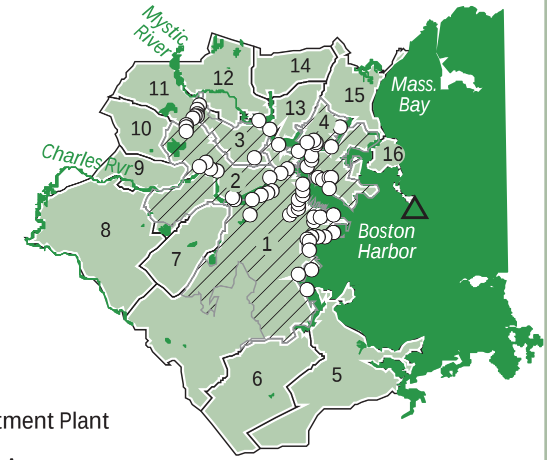
1,270 mgd (primary)
540 (secondary)

Receiving Water(s)

Charles River, Upper Mystic River, Alewife Brook

1 Boston
2 Cambridge
3 Sommerville
4 Chelsea
5 Quincy
6 Milton
7 Brookline
8 Newton
9 Watertown
10 Belmont
11 Arlington
12 Medford
13 Everett
14 Malden
15 Revere
16 Winthrop

Outfall
Wastewater Treatment Plant
Combined Sewer Area



Controls

- The current expanded treatment plant capacity is 540 mgd of secondary treatment and 1,270 mgd of primary treatment.
- Five CSO treatment facilities provide screening, disinfection, and dechlorination for more than half of CSO discharges.
- A network of 70 temporary and 200 permanent flow meters was used to assess system function and develop a collection system model.

Photo: New dechlorination system at the Cottage Farm POTW. *Courtesy of MWRA.*

Program Highlights

- 21of 84 CSO outfalls have been eliminated.
- 15 additional CSO outfalls will be eliminated when the CSO plan is fully implemented by 2008.
- It is estimated that CSO volume has been reduced from approximately 3,300 million gallons in 1988 to 850 million gallons in 2000.
- MWRA worked with the State of Massachusetts to collect data sufficient to support revision of water quality standards for segments of the Charles River and the Upper Mystic River and Alewife Brook.

Background on Boston CSOs

The Massachusetts Water Resource Authority (MWRA) provides wastewater services to 43 communities, including the City of Boston and the surrounding metropolitan area. It owns and maintains 228 miles of interceptor sewers that receive wastewater from 5,400 miles of municipal sewers at over 1,800 separate connections.

As a result of a civil judicial action initiated by EPA, MWRA was required to implement secondary treatment and CSO controls. MWRA's LTCP addresses 84 CSO outfalls permitted to MWRA or to the Boston Water and Sewer Commission, the City of Cambridge, the City of Chelsea or the City of Somerville (the "CSO communities"). Some of the outfalls have been closed through NMC and LTCP efforts completed to date. Flows at six of the outfalls presently receive screening, disinfection and dechlorination at five CSO treatment facilities owned and operated by MWRA. More than half of the CSO flow discharged to area waters passes through these five facilities.

MWRA's CSS area covers 14 square miles, with a service population of 550,000 people. The separate sewer service area is 393 square miles, with a service population of about two million people. All wastewater flow is conveyed to the new Deer Island Wastewater Treatment Plant, which was upgraded in 1999 to expand capacity and provide secondary treatment.

The Deer Island Wastewater Treatment Plant has an average dry weather design flow of 480 mgd. It currently treats an average dry day flow of 330 mgd and an average daily flow (dry and wet days) of 375 mgd. The plant has a primary treatment capacity of 1,270 mgd and a secondary treatment capacity of 540 mgd. Flows that exceed 540 mgd are bypassed around secondary treatment, blended with primary and secondary effluent, and discharged through MWRA's 9.5-mile ocean outfall.

Status of Implementation

In 1987, MWRA entered into a stipulation in the Federal Court Order in the Boston Harbor Case by which it assumed responsibility for development and implementation of an LTCP for its CSO outfalls, as well as outfalls owned and operated by its CSO communities. In December 1994, MWRA completed the Final CSO Conceptual Plan and System Master Plan (the "Conceptual Plan"), in which MWRA recommended short-term and long-term CSO control plans (MWRA, 1994). The LTCP was developed in the context of a system-wide master plan and in accordance with the new CSO Control Policy issued by EPA in April 1994. In addition to CSO control, the master planning process considered system improvement strategies that addressed transport capacity, treatment capacity, and infiltration/inflow removal.

The Conceptual Plan recommended more than 100 system optimization projects that could be implemented immediately at relatively low cost to maximize wet weather conveyance and in-system storage in the short-term. For the long-term, it recommended 28 wastewater system improvements covering a range of CSO control technologies that targeted site-specific CSO impacts and site-specific water quality goals.

In August 1997, MWRA completed the Final CSO Facilities Plan and Environmental Impact Report (the "Facilities Plan"), which carried the Conceptual Plan projects through facilities planning and state environmental review processes, resulting in some plan changes (MWRA, 1997). The Facilities Plan recommended 25 projects to control CSO discharges to 14 receiving water segments.

For each of the projects in the plan, design, and construction milestones have been incorporated into the Federal Court schedule. To date, seven of the 25 projects are complete, and an additional 11 projects are in construction. All projects are to be completed by November 2008.

System Characterization

The key performance measures used by MWRA in developing the plan and monitoring achievement of plan goals are frequency and volume of CSO "in a typical rainfall year". The typical rainfall year was developed by MWRA using 40 years of rainfall records and approved by EPA. MWRA conducted a metering and modeling program in 1992-1993 to support development of the LTCP. Meters were installed at more than 70 CSO outfall locations for a period of at least several months. MWRA also utilized data from more than 200 permanent flow meters it maintains throughout its collection system. MWRA conducts receiving water and sediment sampling to track water quality trends, including fecal coliform, enterococci, anthropogenic viruses and bacteriophage, chlorophyll, nutrients, DO, clarity, toxic contaminants and other parameters.

To meet long-term NPDES monitoring requirements, MWRA is evaluating hydraulic models and will select and build an appropriate model for future applications to assess system and facility optimization. When it becomes available, the new model will be used to estimate CSO discharges for NPDES reporting purposes and to assess system performance as MWRA continues to implement the LTCP. Along with this new hydraulic model, the MWRA will implement permanent meters located in the collection pipes and at each of the CSO facilities, headworks and pumping stations. Temporary meters will be installed at or just upstream of CSO outfalls. Installation and collection of data from temporary meters will be scheduled on a rotating subsystem basis, with preference given to those outfalls for which the information is most critical (e.g., where a CSO control project has been completed and performance verification is desired). At CSO treatment facilities, the NPDES permit requires sampling and monitoring activities, and MWRA performs additional sampling and monitoring for routine operational control purposes. MWRA's NPDES permit includes limits on bacteria, residual chlorine, toxicity and pH at CSO treatment facilities.

NMC

MWRA submitted its NMC compliance documentation on December 31, 1996. Dry weather overflows caused by capacity problems or other structural conditions were eliminated in the early 1990's through a series of fast-track CSO projects. Control of dry weather overflows is now managed through field operations efforts, including frequent system inspections and routine and as-needed maintenance, to remove obstructions.

Public notification is provided through the posting of signs at every CSO outfall, and through a flagging system at beaches and in other high-use recreational areas, such as the Charles River.

LTCP

MWRA's LTCP was developed using the demonstration approach. This included utilization of a watershed-based analysis to consider CSO and non-CSO sources and the potential for attainment of water quality standards in each of 14 receiving water segments in or as a tributary to Boston Harbor or Dorchester Bay. The contribution of CSO discharges to water quality degradation was evaluated in detail, and a baseline water quality assessment was performed in 1993-1994. The 1997 Facilities Plan became the primary source of information for a use attainability analysis (UAA) that was prepared by the Massachusetts Department of Environmental Protection (DEP) to support its approval of the CSO plan, including review and revision of water quality standards.

The CSO plan proposes elimination of CSO discharges to critical use areas (i.e. beaches and shellfish areas), significant reduction or treatment of discharges to less sensitive waters, and means to control floatable materials where CSO discharges will remain. All 25 projects in MWRA's LTCP were approved by EPA and DEP in 1997-1998, and are included in the Federal Court Order in the Boston Harbor Case, with detailed design and construction milestones. However, MWRA is reevaluating several projects, which may result in significant project changes that will have to be approved. In addition, the level of CSO control for the Charles River and for the Upper Mystic River/Alewife Brook is under review, pursuant to water quality standards variances issued by DEP. Final water quality standards determinations are expected to be made at the end of the variance periods (currently October 2001 and March 2002).

As of May 2001, CSO discharges have been eliminated at 21 of the 84 outfalls. An additional 15 outfalls are scheduled to be closed to CSO discharges by 2008, when the CSO plan is fully implemented.

Costs

The capital cost for design and construction to implement the LTCP is estimated to be $548 million (in 2001 dollars). Approximately $110 million has been spent. Annual O&M cost for the CSS is estimated to be $2 million per year.

Water Quality Issues

Implementation of the NMC has resulted in the elimination of dry weather overflows and a significant reduction in CSO discharges. The CSO reductions to date are primarily due to capital-intensive programs to increase conveyance capacity to the new Deer Island Treatment Plant, and to CSO system optimization plans that maximized in-system storage through weir raising and tide gate repair/replacement. Receiving water sampling programs show steady water quality improvement over the past decade.

Completion of MWRA's LTCP is intended to bring CSO discharges into compliance with water quality standards. Final decisions on what those standards should be for the Charles River, Alewife Brook and Upper Mystic River will not be made until additional water quality information is collected and evaluated by MWRA and the DEP, pursuant to conditions in the water quality standards variances. In all receiving water segments, water quality standards may at times continue to be violated due to non-CSO sources (e.g., storm water) following full implementation of CSO controls in the LTCP.

Enforcement Issues

Development and implementation of the LTCP are subject to detailed schedule milestones in the Federal Court Order in the Boston Harbor Case. MWRA's recently renewed NPDES permit (Phase I CSO) also requires implementation of the plan. Phase II CSO requirements are expected to be added to the permit soon, and will require CSO discharges to meet the Facilities Plan CSO activation frequency and volume predictions, as the CSO plan is implemented.

Results and Accomplishments

MWRA estimates that total annual volume of CSO discharge has been reduced from about 3.3 billion gallons in 1988 to about 850 million gallons today, primarily through improvements to its Deer Island Treatment Plant and transport system. Seven of the 25 CSO construction projects that make up the LTCP are complete, and 11 more are in construction. Full implementation of the LTCP is predicted to further reduce discharges to about 400 million gallons, with approximately 95% of the remaining CSO flows receiving screening, disinfection and dechlorination.

In addition to closing 21 of the 84 outfalls to date, MWRA has virtually eliminated residual chlorine in chlorinated effluent from its CSO treatment facilities, which process more than half of the approximately 850 million gallons of CSO presently discharged to metropolitan Boston waters in a typical year.

References

Kubiak, David, Massachusetts Water Resource Authority, Boston,MA. Personal communication with Limno-Tech, Inc. staff on details of the combined sewer overflow plan and program. Summer 2001.

MWRA, 1994. Final CSO Conceptual Plan and System Master Plan. Boston, MA.

MWRA, 1997. Final CSO Facilities Plan and Environmental Impact Report. Boston, MA.

Number of CSO Outfalls

30 (originally)
24 (currently)

Combined Sewer Service Area

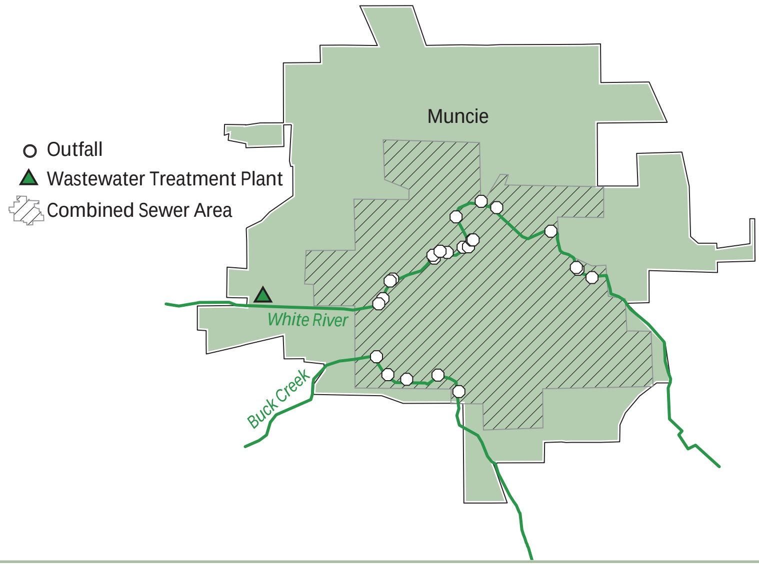
10.2 square miles

Wastewater Treatment Capacity

27 mgd (tertiary)

Receiving Water(s)

White River, Buck Creek



Controls

- Muncie's CSO abatement efforts have focused on sewer separation and treatment plant upgrades.
- Better O&M practices (e.g., sewer flushing and street sweeping) have improved system performance during wet weather.
- The presumption approach was used as the basis for development of the LTCP scheduled to be submitted to the state by November 2001.
- A SWMM model was used in system characterization and to evaluate the collection system/controls.

Photo: The White River, one of Muncie's two CSO receiving waters.
Courtesy of Nathan Bilger

Program Highlights

- CSO outfalls have been reduced from 30 to 24.
- Muncie has implemented the NMC.
- Muncie is working on a Use Attainability Analysis (UAA) to request a temporary suspension of designated uses during wet weather.
- Muncie recently completed a $5 million sewer separation projects in response to a 1985 enforcement action.

Background on Muncie CSOs

The Muncie Sanitary District (MSD) provides sewer service to the City of Muncie, Indiana and to a number of developments outside the city. The Muncie Water Pollution Control Facility (WPCF) has a capacity of 27 mgd (Huyck, 2001). It is anticipated that the MSD service area will continue to grow. Two newly developed sewer systems in surrounding areas are expected to eventually discharge to the WPCF.

Status of Implementation

MSD prepared a Stream Reach Characterization & Evaluation Report (SRCER) in 1999 to meet a requirement of its NPDES permit (Amlin, 1999). The SRCER details the impacts of CSOs on the White River. MSD used a SWMM model to facilitate SRCER development and to evaluate its combined sewer system. Total inflow to the collection system, average annual pollutant loadings, and average annual discharge loadings were calculated from the SWMM model simulations. The SRCER also includes proposed controls for CSO abatement. SRCER recommendations were considered in the development of Muncie's LTCP, described below.

Nine Minimum Controls

MSD has implemented the NMC as described in EPA's 1994 CSO Control Policy. A CSO Operational Plan, required by the state, serves as a reporting mechanism for eight of the nine minimum controls. MSD Operational Plan was approved March 24, 2001. The SRCER, also required by the state, fulfils the monitoring requirement of the ninth minimum control.

MSD has collected water quality and biotic data from affected areas of the White River through baseline studies for the past 26 years. Results of the baseline studies are presented in the SRCER. While the data show dramatic improvement in the water quality in the White River through Muncie, as measured by both chemical and biological indices, improvements are not only due to CSO abatement efforts. Improvements in water quality likely reflect the composite of pollution abatement programs, including CSO control efforts, sewer cleaning, street sweeping, and public education. Currently, MSD is enumerating *E. coli* populations, on a weekly basis, above and below the MSD CSO outfalls known to potentially affect the water quality of the West Fork of the White River.

MSD has not experienced dry weather overflows. As part of its maintenance program, MSD has recently purchased two new jet-vactor trucks and one new street sweeper. Two sweepers are used five days per week, weather permitting. The jet-vactor trucks clean sewers and manholes on a continuous basis, five days per week.

MSD public notification activities include public meetings and sign placement near the CSO outfalls. Recently, MSD and the Citizen's CSO Advisory Committee held two meetings regarding the LTCP. MSD has prepared warning signs to be placed at selected CSO outfalls to warn citizens about possible health hazards as a result of CSO discharges. The signs direct observers to call MSD if they witness dry weather overflows. Brochures describing the LTCP have been prepared, and MSD plans to distribute them when the LTCP has been finalized. In addition, MSD plans to use its web site to explain CSOs and intends to develop a video for public information and education.

To date, sewer separation and treatment plant upgrades have been important components of MSD's CSO abatement efforts. In addition, MSD has improved the operation of the existing combined system with more extensive O&M practices (e.g., street sweeping and sewer cleaning).

Long Term Control Plan

MSD is using the presumption approach in developing its LTCP. Under the terms and conditions of its NPDES permit, MSD must submit an LTCP by November 2001. As stated above, information obtained from SRCER and SWMM model is being used to develop the city's LTCP. MSD is currently in the process of selecting the CSO abatement alternatives for its LTCP.

Muncie's draft LTCP gives priority to eliminating discharges to sensitive areas. Public input is also an important component of the LTCP and is required by EPA and Indiana Department of Environmental Management (IDEM). A subcommittee of the Muncie Citizens CSO Advisory Committee has been established to determine those areas along the White River considered to be the most sensitive (e.g., parks, schools, and places of public use). CSOs that discharge to sensitive areas will be eliminated, relocated, or treated.

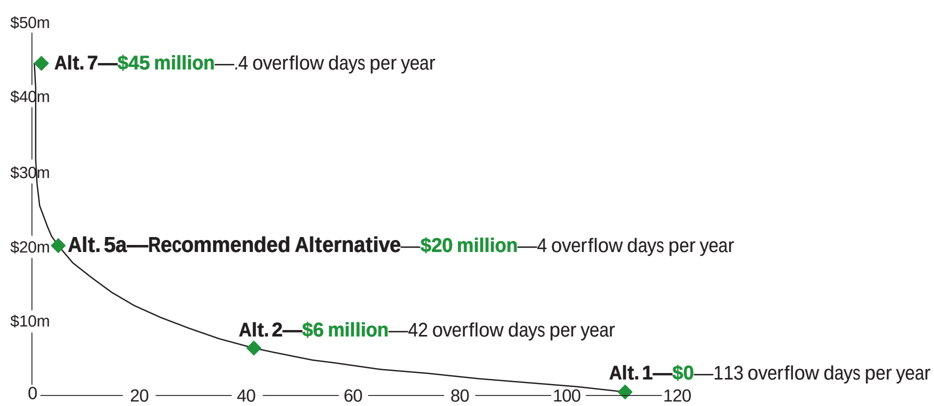
Costs and Financing

MSD has spent over $5 million on sewer separation over the past 10 years. Currently, MSD is spending $15.5 million for improvement and renovations to its WPCF to provide better treatment of sewage and combined sewage. Upon approval of the LTCP by IDEM, additional funds will be appropriated for improvements to the WPCF, the conveyance system, and storage facilities. MSD has spent in excess of $200,000 in engineering fees for SWMM modeling, and $550,000 has been spent for two new jet-vactor trucks and a new street sweeper. MSD spends approximately $340,000 per year to keep the jet-vactor trucks and street sweepers operating continuously five days per week.

MSD is currently in the process of selecting cost-effective CSO abatement alternatives for its LTCP. Eight CSO control alternatives under consideration are described in the table below. The impact of local sewage rate increases are considered by MSD when evaluating alternatives and implementation schedule. MSD is working on the financial capability assessment that is required by IDEM when scheduling CSO control projects. The State Revolving Loan program is an important funding source for CSO control projects.

Alternative (MG/year)	CSO Volume (lbs/year)	CBOD Load Days/Year	Overflow	Cost	Description of Alternative
1	434	78,328	113	$0	"No Action"
2	358	64,621	42	$6,755,000	In-system storage
3	188	56,571	42	$22,176,000	Partial sewer separation
4	286	52,524	113	$6,027,000	Increased pumping and WPCF primary treatment
5	41	6,315	42	$15,687,000	25 MG storage basin, increased pumping, WPCF treatment, and in-system storage
5a	27	5,173	4	$19,815,000	25 MG storage basin, increased pumping, in-system storage, and separation at CSO 28
6	40	3,743	29	$31,108,000	25 MG storage basin, increased pumping, WPCT treatment, in-system storage, and partial sewer separation
7	0	0	0.4	$45,410,400	Complete sewer separation

An evaluation of modeling results and monitoring data indicates that the presumptive criteria for the LTCP can be met through the implementation of Alternative 5a at a cost of $19.8 million (in 2000 dollars). Alternative 5a involves a combination of CSO controls including a 25 million gallon storage basin, increased pumping and WPCF treatment, in-system storage, and sewer separation. It is the most cost-effective solution for the MSD CSO control plan, as shown on the "knee-of-the-curve" graph below.



Affordability constraints make the elimination of all CSOs (e.g., Alternative 7) unfeasible. Elimination of all CSOs is estimated to cost $45-65 million. IDEM has not approved any of the CSO abatement alternatives considered by MSD for its LTCP, including Alternative 5a. MSD is scheduled to submit its LTCP in November 2001 for state review.

One of the greatest needs for MSD is the replacement of some of the sewer infrastructure. Many of the sewers are approaching 100 years in age and need to be replaced or restored. For example, the main interceptor from the downtown area to the WPCF is 100 years old. It needs to be completely lined and structurally repaired. The preliminary estimate for this repair work is approximately $2 million, and is included in the cost-effective alternative for CSO reduction.

Water Quality Issues

MSD believes that the implementation of the NMC has reduced the frequency and duration of overflows over the past several years, primarily through sewer cleaning activities. However, data is not available to document the reductions.

The MSD stream monitoring program has found that non-CSO sources of pollution greatly affect the White River. Consequently, MSD believes that compliance with existing water quality standards will not be achieved even if all CSOs are eliminated. MSD is working on an IDEM required Use Attainability Analysis (UAA) to support a request for a temporary suspension of designated uses during wet weather.

Enforcement Issues

In 1985, IDEM issued an Agreed Order to MSD as a result of a fish kill in the White River, attributed to pollutant levels from a "first flush" of the CSOs. The $5 million sewer separation project, mentioned above, was completed as a result of the Agreed Order. Since 1985, no fish kills attributable to MSD CSO discharges have occurred.

Results

MSD has spent $5 million on sewer separation projects. MSD has also improved O&M practices within the collection system (e.g., street sweeping five days per week). In addition, upgrades are being made to the WPCF to increase the treatment efficiency at the plant. MSD has eliminated six CSOs to date.

MSD applied a SWMM model to evaluate its collection system and to investigate impacts of its CSOs on the White River. A SRCER was produced to document model findings, describe monitoring efforts in the White River, and present recommendations for future CSO abatement efforts. MSD is currently in the process of developing its LTCP, and the SRCER has been instrumental in this process. The ultimate goals of the MSD LTCP are as follows:

- Capture "first flush" of the CSOs.
- Remove solids and floatables.
- Decrease bacterial levels.
- Reduce discharges to the minimum level affordable.
- Eliminate CSOs to sensitive areas.

References

Amlin, Eugene P.E., 1999. *Stream Reach and Characterization and Evaluation Report*. Muncie, IN.

Huyck, Richard, Director, Bureau of Water Quality, Muncie Sanitary District. Personal communication with Limno-Tech,Inc. staff on details of CSO system and CSO control planning in Muncie, and review of case study. Spring/Summer 2001.

Community Case Study North Bergen, NJ—Region 2

Number of CSO Outfalls

10

Combined Sewer Service Area

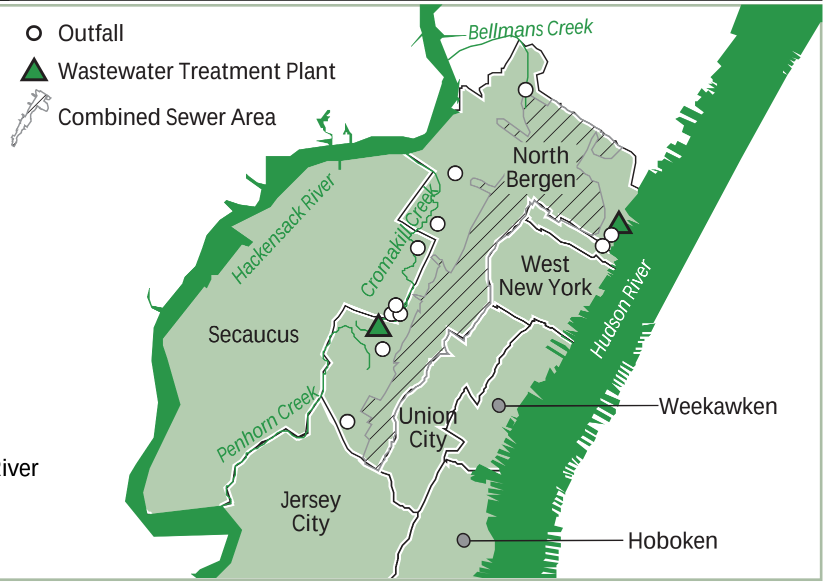
1.8 square miles

Wastewater Treatment Capacity

10 mgd

Receiving Water(s)

Bellmans Creek, Penhorn Creek, Cromakill Creek, Hudson River



Controls

- The minimum controls required by the New Jersey Department of Environmental Protection (NJDEP) permit have been implemented.
- Solids and floatables control has been installed at all CSO outfalls.
- Netting technology is used at most outfalls to control floatables. There are two end-of pipe chambers, three in-line chambers, two floating trash traps, and one manually-cleaned bar rack.

Photo: Solids and floatables controls, such as the nets pictured here, are installed at all North Bergen CSOs. *Courtesy of NJDEP*

Program Highlights

- North Bergen has reduced the number of overflow points from 13 to 10.
- The solid and floatables control facilities have captured more than 68 tons of debris that would have been discharged to the Hudson River and various tributaries of the Hackensack River.
- Approximately 40 tons per year of solids are removed by in-line and end-of-pipe netting systems.

Background on North Bergen CSOs

The township of North Bergen, New Jersey has a population of approximately 48,000. North Bergen is served by a CSS that covers 1,130 acres. The North Bergen Municipal Utilities Authority (NBMUA) is responsible for all CSOs and control systems within the township. Two wastewater treatment plants service the township. The Central Treatment Plant services the West Side of North Bergen and lies within the Hackensack River drainage basin. The Woodcliff Treatment Plant services the East Side of North Bergen and lies within the Hudson River drainage basin.

There are currently 10 CSO outfalls in the North Bergen CSS that are regulated by 36 flow control chambers. Six of the flow control chambers have mechanical regulators which limit the flow to the interceptor by means of a sluice gate and a float mechanism. The other 30 chambers use static control devices such as weirs, baffles, or orifices to control flow to the interceptor and allow excess overflow to the CSO outfalls.

Status of Implementation

NBMUA's control plan has focused on solids and floatables control (Fischer, 2001). Solids and floatables controls have been installed at all CSO outfalls to capture half-inch in diameter and larger materials. Nine CSO outfall pipes have been retrofitted with netting technology, and one CSO outfall uses a stationary bar rack for floatables control. The start-up date for the entire CSO control system was December 17, 1999.

Other infrastructure improvements made by NBMUA as part of their efforts to control CSOs include installation of a new vortex valve regulator upstream of an existing pump station, and installation of a separate 48-inch combined sewer outfall pipe that eliminated the older systems which combined the plant outfall and the CSO.

System Characterization

NBMUA completed a *Combined Sewer Overflow Characterization Study* in 1997 (Killam, 1997). NBMUA plans to conduct additional flow and water quality monitoring as part of its CSO control plan. The monitoring information will be used to develop a SWMM/EXTRAN model of the CSS. The monitoring and modeling plan is currently under review by NJDEP.

Nine Minimum Controls

NBMUA has implemented the minimum controls required by their NPDES permit, including :

- Prohibition of dry weather overflows
- Solids and floatables control
- Development and implementation of proper operation and maintenance (O&M) programs
- Maximization of flow to the publicly owner treatment works (POTW)
- Public notification/reporting requirements

Long Term Control Plan

The control plan adopted by NBMUA focuses on the control of solids and floatables. Cost estimates have been computed for disinfection at outfalls that may be added at a future date. Full LTCP development is incorporated into the ongoing statewide watershed management and TMDL processes.

Costs and Financing

The $3.9 million solids and floatables project was funded through a low interest loan provided by the NJDEP and the New Jersey Environmental Infrastructure Trust (NJEIT). By using the NJDEP/NJEIT loan, the NBMUA saved the users of the system nearly $1.5 million compared to conventional financing. Cost estimates to add disinfection with ultraviolet lamps have been performed as part of the planning process. Disinfection at nine CSO outfalls is expected to cost approximately $24.2 million.

Budget tracking for CSO-related O&M has been set up, but sufficient data is not yet available to estimate annual O&M costs. O&M primarily consists of changing out the netting bags and disposing of the collected solids. Nets are changed out approximately once per month at each of the sites.

Enforcement Issues

In September 1993, NJDEP issued an Administrative Order citing NBMUA for failing to meet the CSO permit discharge requirements. In January 1996, NBMUA entered into an Administrative Consent Order to submit, among other things, an Interim/Final Solids and

Floatables Control Plan. The Interim/Final Solids and Floatables Control Plan was approved by NJDEP in July 1996 and involved reducing the number of CSO outlets from 13 to 10 and installing solids and floatables netting devices at each of the CSOs (EPA, 2001).

Results

Since installing the netting systems in 1999, the solid and floatables control facilities have captured more than 68 tons of debris that would have been deposited in the Hudson River and various tributaries of the Hackensack River. It is estimated that over 40 tons of solids will be removed per year through implementation of the Solids and Floatables Control Plan. The tracking of the debris captured is a measure that is well understood by the public.

Lack of historical operating information on the technology was a hurdle for this project. At the time of the planning study, netting technology in in-line chambers had not been installed or operated as a solid and floatable collection technique anywhere in the United States. NBMUA now has extensive experience operating solids and floatables control facilities and can provide other CSO communities with construction and operational information needed to make decisions utilizing netting technology for CSO solids and floatables control.

References

EPA, 2001. *Combined Sewer Overflows in Region 2: Audit Report of the Inspector General*. New York, NY.

Killam, 1977. *Combined Sewer Overflow Characterization Study*. Milburn, NJ.

Fischer, Robert, Executive Director, North Bergen Municipal Utilities Authority. Personal communication with Limno-Tech, Inc. staff on details of the combined sewer overflow plan and program. Summer 2001.

Community Case Study — Randolph, VT—Region 1

Number of CSO Outfalls

6 (originally)
3 (currently)

Combined Sewer Service Area

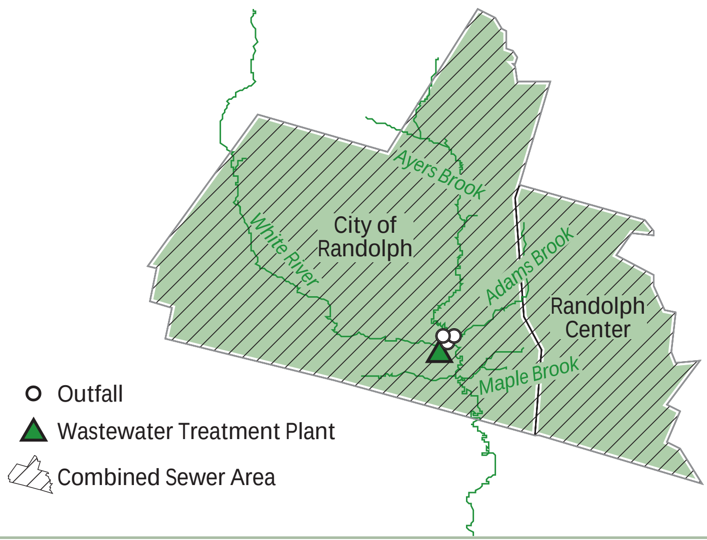
Undetermined

Wastewater Treatment Capacity

0.4 mgd (secondary)

Receiving Water(s)

White River



Controls

- Randolph has implemented the six minimum controls required in its NPDES permit.
- Sewer separation has been the principal CSO control implemented. Randolph has disconnected 44 of its 52 catch basins from the CSS.
- Randolph is planning to upgrade its wastewater treatment plant (WWTP) as part of the next phase of its CSO control efforts.

Photo: Three branches of the White River flow through Randolph. Gifford Bridge, shown, is located on the Second Branch.
Courtesy of Tom Hildreth

Program Highlights

- CSO outfalls have been reduced from six to three through sewer separation.
- Sewer separation has reduced the duration of overflows at the WWTP by 80 percent.
- The target date for completing implementation of CSO controls is 2006.
- A February 2001 Administrative Order requires Randolph to implement a sampling protocol and monitoring for its three remaining outfalls.

Background on Randolph CSOs

Randolph has a population of 2,270 and is located in the Green Mountains in central Vermont, approximately 27 miles from the state capital Montpelier. The exact size of the combined sewer system is small but undetermined, and centered in the older downtown area.

Status of Implementation

Randolph has completed sewer separation projects in three stages. The main CSO abatement project was completed in 1996, when 44 of 52 catch basins were separated from the collection system in the village area. New storm water collection systems were also constructed throughout much of downtown Randolph and adjacent residential areas at this time. More work was completed in 1997 and 1999 when an additional six catch basins were separated. At the present time, it is estimated that three catch basins remain connected to the sanitary system. No monitoring to assess the effectiveness of the work completed is available. At the direction of the State of Vermont, Randolph is undertaking an eight-month study to determine the effectiveness of CSO efforts implemented to date, and to determine if additional work may be required.

Nine Minimum Controls

The State of Vermont has not required CSO communities to implement all of the NMC as part of their NPDES permits. Nonetheless, on a community-specific basis, the state has required that systems employ a series of BMPs. As required by their permit Randolph has documented implementation of the following BMPs:

- Proper O&M programs for the sewer system and the CSOs
- Maximum use of the collection system for storage
- Maximization of flow to the POTW for treatment
- Prohibition of CSOs during dry weather
- Pollution prevention
- Monitoring

Long-Term Control Plan

The State of Vermont does not require CSO communities to submit formal documentation for its long-term CSO control plans. Instead, communities are required to submit engineering reports to outline their CSO abatement plan and funding needs. On February 3, 1993, Randolph submitted the final engineering report of the "Evaluation of Combined Sewer Overflows for Randolph" to the state. This report was approved on November 19, 1993. To date, sewer separation has been the principal focus of the town's abatement efforts to eliminate CSOs.

The State of Vermont uses a design storm approach to CSO elimination. In Vermont, communities that opted for sewer separation were required to be able to capture and provide full treatment for a minimum design flow generated by a 24-hour, 2.5 inch rainfall.

Randolph completed their initial control plan in November 1996. Upon further investigation, it was determined that the completed sewer separation projects were not fully successful in controlling CSOs. Bypasses still occurred at the WWTP during rain events. Further data was needed to evaluate the town's CSO abatement program, and to plan future abatement projects. The CSO control plan was reopened, and the target date for implementing the revised control plan is 2006.

Costs

Preliminary engineering and design work for Randolph's CSO abatement program took place between 1991 and 1994. This work was funded through a state planning advance program, and costs were approximately $0.25 million. As of 1997, approximately $2.66 million had been spent for Randolph's main CSO abatement program and development of its first LTCP. Funding was provided through state grants (25 percent), through state revolving loans (50 percent), and from Randolph (25 percent).

A capital plan has been proposed for the next stage of the CSO abatement program. Randolph requested wastewater revolving loan funds on August 8, 2000 to upgrade the WWTP and to address inflow and infiltration issues and other CSO control needs. The plan, which includes infrastructure repairs and sewer separation, spans six years (2001-2006), and has a projected cost of $1.12 million. Approximately $0.5 million is related to CSO control. The planned projects include sewer line replacement and upgrades, collapsed and failing manholes replacement and reconstruction, and continued sewer separation.

Enforcement Issues

Although Randolph has reduced CSOs events through sewer separation projects, overflows still occur. Randolph experienced 17 overflows at the WWTP in the year 2000. For this reason, the state issued an Administrative Order (1272 Order #3-1198) to Randolph, dated February 8, 2001. This Administrative Order requires Randolph to develop a CSO monitoring plan/sampling protocol for its three existing CSO outfalls (Kooiker, 2001).

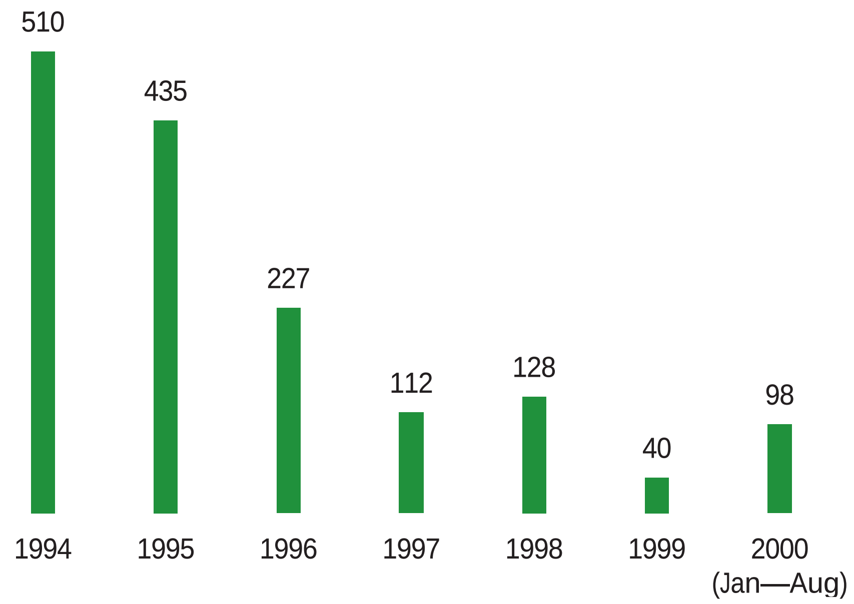
The Administrative Order requires Randolph to obtain composite samples of the combined discharge from the WWTP during eight CSO events between March 1 and September 30, 2001. The composite samples will be analyzed for biochemical oxygen demand, total suspended solids, and *E. coli.* to determine compliance with the permitted discharge effluent limits. The other two CSO outfalls are also being monitored for overflow events using "tattle-tale" blocks, or block testing. Blocks of wood will be placed inside the overflow or pump station lines. Movement of disappearance of a block following a precipitation event indicates that an overflow has occurred. A rain gage is being used to document the cumulative rainfall amount, rainfall intensity, and rainfall duration so that local precipitation events can be quantified and related to sewer system performance.

The data collected from implementation of this monitoring plan will provide guidance on remaining CSO control needs and help Randolph identify the best course of action for future CSO abatement efforts. A CSO abatement program effectiveness report will be submitted to the state (due September 30, 2001) to fulfill the requirements set forth in the Administrative Order.

Results

Three CSO outfalls have been eliminated since Randolph initiated its CSO abatement program. Only three known catch basins remain connected to the sanitary sewers as a result of Randolph's sewer separation efforts. An 80 percent reduction in the duration of CSOs has been observed at the WWTP. This reduction is based upon a comparison of data collected from a recent 20-month period (1/1999-8/2000) with data collected prior to the main CSO abatement project. Overflow (bypass) data at the Randolph WWTP are provided in the accompanying graph. (Note: 1999 was a very dry year and 2000 was a very wet year.)

Bypass History at Randolph WWTP (hours per year)



References

Town of Randolph, 1993. *Evaluation of Combined Sewer Overflows for the Town of Randolph*, submitted to the Vermont Agency of Natural Resources (ANR). Randolph, VT.

Kooiker, Brian, State of Vermont, Agency of Natural Resources, Department of Environmental Conservation, Wastewater Management Division. Personal communication. Spring/Summer 2001.

Community Case Study — Richmond, VA—Region 3

Number of CSO Outfalls

31, plus 1 diffuser port in the James River

Combined Sewer Service Area

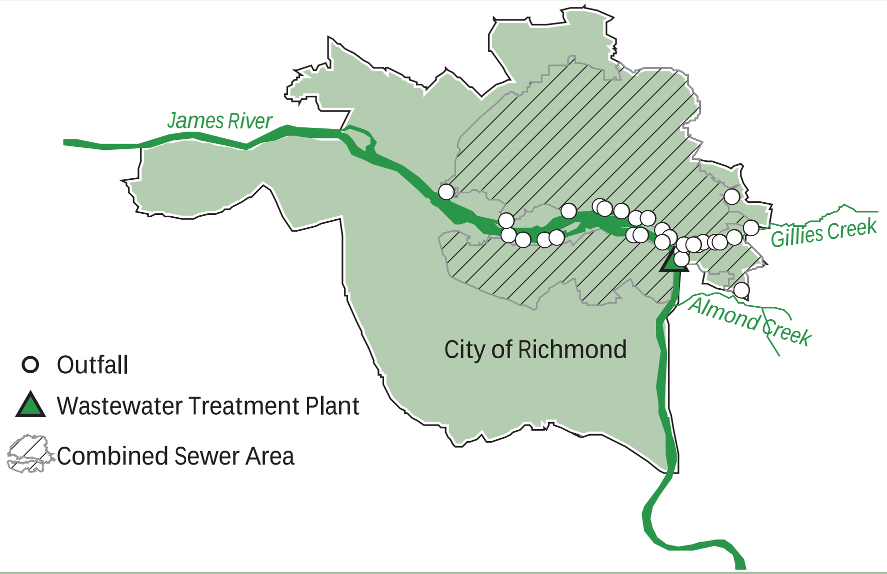
18.8 square miles

Wastewater Treatment Capacity

75 mgd (secondary)

Receiving Water(s)

James River, Gillies Creek



Controls

- Richmond has implemented the NMC and documents continued compliance in an annual report submitted to the Virginia Department of Environmental Quality (DEQ)
- Richmond utilizes a 50 million gallon retention facility to capture and store for later treatment wet weather flows from the city's largest drainage basin.
- Conveyance and retention facilities have been employed to relocate CSO discharges downstream of the Falls of the James, a well-known recreation area frequented by kayakers.

Photo: Construction of a 6.7 million gallon storage tunnel along the Falls of the James.
Courtesy of Richmond DPU

Program Highlights

- Richmond submitted a Draft Long-Term CSO Control Plan Re-Evaluation in May 2001 to the DEQ.
- LTCP Phase I and II controls have reduced overflow volumes by 40 percent.
- LTCP Phase I and II controls provide an additional 131 days per year in which water quality in the James River meets water quality standards, beyond the "no CSO control" condition.
- Restoration of the city's historic canal system occurred as Phase II CSO interceptors were placed in an abandoned canal bed. Restoration of the canal was a centerpiece of a major downtown revitalization project.
- Sampling to support Phase III controls indicates that upstream bacteria loads will prevent attainment of water quality standards even if CSOs were completely eliminated.

Background on Richmond CSOs

Richmond is the capital of Virginia and it is centrally located in the state. The population of Richmond is approximately 210,000, and the city spreads out over 38,000 acres. The CSS is owned and operated by the Department of Public Utilities (DPU), and it occupies 12,000 acres, or one-third of the city. The DPU also owns and operates a 75 mgd wastewater treatment plant (WWTP). The James River bisects the city and is the center of transportation and recreation activities. The Falls of the James area is an important recreational resource and a component of the Virginia scenic river system. It consists of sets of rapids and pools and adjacent parkland that provide substantial habitat and attract whitewater enthusiasts. There are 31 CSO outfalls within Richmond that discharge to the James River or local urban creeks. The Shockoe Creek CSO is the largest, with a drainage area of over 6,000 acres. It discharges to the tidal James River, just below the Falls of the James.

Richmond has been actively implementing CSO controls for over 20 years in a three-phase program. Phase I was completed in 1990 and Phase II will be completed in 2002.

The plan for Phase III was submitted to the Virginia DEQ as a Draft Long Term CSO Control Plan Re-Evaluation in May of 2001 (City of Richmond, 2001).

Status of Implementation

Richmond began addressing CSO problems back in the 1970s. Early studies including monitoring and modeling led to the Phase I program. Completed in 1990, the major components of Phase I were construction of the 50 million gallon Shockoe Retention Facility and expansion of WWTP capacity from 45 to 70 mgd.

Phase II controls were planned in the late 1980s and implemented in the 1990s. Phase II was focused on reducing CSO discharges to the Falls of the James. The major components of Phase II included expansion of conveyance facilities on the south side of the James River, expansion of conveyance facilities on the north side of the James River, and construction of a 6.7 million gallon storage tunnel on the north side (scheduled to commence operation in late 2001). Another aspect of Phase II was a requirement to re-evaluate the CSO control plan following implementation and develop a Phase III plan.

System Characterization

Richmond has engaged in characterization monitoring and modeling activities for nearly 20 years. Key activities include:

- Mapping the combined sewer are to characterize land use and surface features in each drainage area.
- Review of construction documents for collection system to determine sewer diameter, length, and slope.
- Implementation of collection system and receiving water monitoring programs.
- Development and application of collection system and receiving water models.

Nine Minimum Controls

Richmond has identified and implemented control measures under each of the NMC. Documentation was submitted to DEQ in December 1996 (City of Richmond, 1996) and has been followed by annual reports on continued compliance. Highlights of the NMC program include:

- Adjustment of CSO regulator controls to optimize storage in interceptor system.
- Formation of a 24-hour on-call team to respond to reported dry weather overflows.
- On-going public education programs, including offering advice on proper disposal of waste (e.g., household wastes, leaves, use of fertilizers).
- Continued use of BMPs to control pollutants from runoff.
- Installation of continuous flow monitors and wet weather overflow samplers at the Shockoe CSO to monitor frequency and volume, with annual reports provided to DEQ.

Long Term Control Plan

Richmond has been developing and refining its LTCP for over two decades. The continuing objective is to abate or eliminate the adverse impacts to the James River from CSOs through the use of innovative and low maintenance solutions.

Richmond developed a thorough characterization of its CSS through extensive inspections, monitoring and modeling. Monitoring programs have been implemented to quantify:

- Flow and pollutant concentrations at the Shockoe CSO outfall and other select outfalls within the CSS.
- Storage in the Shockoe Retention Facility.

- Water quality conditions in the James River above the CSO discharges, through the Falls of the James area, and along a 20-mile area below Richmond.

Richmond also developed computer models of the collection system and CSO-impacted waters for use in the analysis of CSS performance, receiving water impacts, and the evaluation of control alternatives. Monitoring data was used to calibrate and verify the models.

A full range of CSO control alternatives were evaluated as part of the LTCP development. This evaluation included:

- Sewer separation
- In-system storage
- Disinfection
- High-rate filtration
- Retention basins
- Swirl concentrators
- Sedimentation basins
- Screening
- Additional conveyance capacity
- BMPs and source control
- Expansion of the WWTP

The selection of a preferred plan for Phase III involved analysis of CSO volume and frequency, water quality, financial impacts, and public input. The preferred plan builds on projects completed under Phases I and II. The components of the plan for Phase III included:

- Expansion of the Shockoe Retention Facility
- Expansion of wet weather treatment capacity at the WWTP
- Disinfection at key outfalls
- Control of solids and floatables at remaining outfalls

Costs and Financing

Richmond has used a variety of funding sources including bonds, low-interest loans from the state, and federal grants to underwrite the cost of constructing, operating and maintaining CSO control facilities. To date, the city has spent nearly $221 million on capital improvements in the CSS and invests another $6.7 million annually on CSO-related operations and maintenance activities. The city estimates that implementation of the Phase III controls will cost an additional $242 million.

Water Quality Issues

The implementation of Phases I and II of the city's CSO control program have significantly improved aesthetics and water quality in the James River. Specifically, water quality modeling indicates that these controls provide an additional 131 days per year in which water quality in the James River meets water quality standards, beyond the no CSO control condition. Receiving water modeling results from the Phase III re-evaluation indicates that the upstream bacteria loads will prevent full attainment of the current water quality standards even if the city completely eliminates CSO discharges.

Enforcement Issues

Richmond signed a Special Order with the Virginia DEQ in 1985 that required the city to develop and implement a CSO control program. In 1992, the State Water Control Board issued a consent Special Order requiring implementation of additional controls identified in Phase II of the city's CSO program. Then, in 1996, the DEQ amended the Special Order to accelerate the north side CSO control projects. DEQ issued a consent Special Order to the City in 1999, which advanced the schedule for the re-evaluation of the CSO program in the context of EPA's CSO Control Policy. A draft plan describing the proposed Phase III controls was submitted to the state in May 2001. The city also submits annual detailed reports to the state to allow the state to monitor and verify compliance with the Order.

Results

Richmond has realized many benefits from its CSO control program. The city has reduced overflow volume to the James River by more than 40 percent, from 3 billion gallons per year to 1.8 billion gallons per year. Further, overflows to the sensitive park areas along the James River have been reduced to an average of one event per year. All of the overflows remaining in the park areas now receive local treatment to control solids and floatables prior to discharge to the river. In addition to storage, the Shockoe Retention Facility provides floatables control for more than two-thirds of all overflows.

Richmond's CSO projects have also provided tangential benefits including the restoration of the City's historic canal system as Phase II CSO interceptors were placed in the abandoned canal bed. The restored canal has become a focus for commercial and recreational activities.

Richmond's efforts to control CSOs were recognized in 1999 as the city received a National Combined Sewer Overflows Control Program Excellence Award from EPA. In addition, the Richmond CSO Control Program has received awards and recognition from local environmental and stakeholder groups and from users of the James River.

References

City of Richmond, Virginia. 1996. *Combined Sewer System Documentation Report on Nine Minimum Controls*. Submitted to Virginia Department of Environmental Quality, Richmond, VA.

City of Richmond, Virginia. 2001. *Draft Long-Term CSO Control Plan Re-evaluation*. Submitted to Virginia Department of Environmental Quality, Richmond, VA.

Community Case Study Rouge River Watershed, MI—Region 5

Number of CSO Outfalls

168

Combined Sewer Service Area

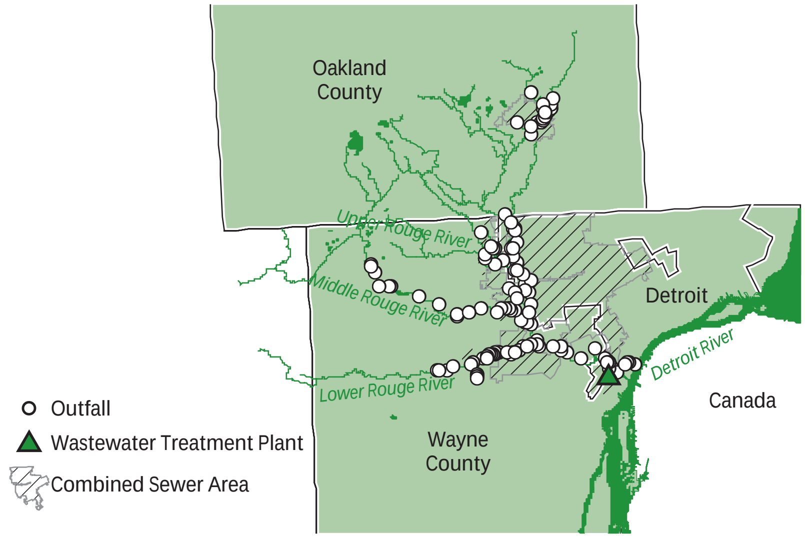
93 square miles

Wastewater Treatment Capacity

1,700 mgd (primary)
930 mgd (secondary)

Receiving Water(s)

Rouge River and tributaries



Controls

- CSO control activities in the Rouge River Watershed are focused on sewer separation and construction of local retention treatment basins.
- The NMC have been implemented for all uncontrolled CSOs for which the construction of permanent control facilities is not imminent.
- Under its NMC program the City of Detroit installed outfall control gates at seven CSOs to eliminate CSO discharges during small events.
- A total of 10 retention treatment basins and one tunnel represent the major new CSO facilities that are planned, under construction, or in operation.

Photo: Retention basin under construction in Dearborn, MI.
Courtesy of EPA

Background on Rouge River Watershed CSOs

The Rouge River Watershed occupies 438 square miles in southeastern Michigan. The south and east portions of the watershed are highly urbanized and include parts of Detroit and its suburbs. The Rouge River Watershed is home to approximately 1.5 million people spread across 48 communities and 3 counties. The Rouge River itself extends for more than 100 miles, with 50 miles flowing through accessible public parklands. The Rouge River discharges to the Detroit River and affects water quality conditions in that water body as well as Lake Erie. Congress appropriated money through EPA and Wayne County, Michigan in 1992 for the Rouge River National Wet Weather Demonstration Project (Rouge Project). The Rouge Project is a comprehensive program to manage wet weather pollution to restore the water quality of the Rouge River. This cooperative watershed management effort between federal, state and local agencies is supported by multi-year grants from the federal government with additional funding from local communities.

Program Highlights

- The Rouge River National Wet Weather Demonstration Project coordinates CSO implementation in 16 CSO communities in conjunction with other non-CSO restoration efforts on a watershed basis.
- About 30 miles of the Rouge River that were CSO-impacted in 1994 are now completely free of uncontrolled CSO discharges.
- The amount of combined sewage captured for treatment has increased due to construction of CSO retention treatment basins.
- Untreated overflows in excess of 50 times per year have been reduced to treated overflows occurring one to seven times per year where retention treatment basins have been implemented.
- Monitoring indicates improved dissolved oxygen conditions associated with the implementation of CSO controls in the Rouge River.

As of 1994, there were a total of 168 permitted CSOs discharging into the Rouge River and its tributaries. These outfalls, owned and operated by Wayne County, the City of Detroit, and 14 other CSO communities, are concentrated in the lower portions of the watershed. Several of the permitted outfalls are reported to be overflow structures which discharge to interceptors, which then discharge into the Rouge River or one of its tributaries. There are 40 CSO outfalls that discharge to the Detroit River that are not included in the Rouge River case study. The combined sewer area comprised 20 percent of the watershed in 1994, or 60,000 acres. All dry weather flows and some wet weather flows from these CSSs are delivered to the Detroit POTW along with other flows from outside the watershed. The Detroit POTW has a primary treatment capacity of 1,700 mgd and a secondary treatment capacity of 930 mgd.

Status of Implementation

Michigan's equivalent to the NMC has been implemented for all uncontrolled CSOs for which the construction of permanent control facilities is not imminent. The most significant NMC capital expenditure was the construction of outfall control gates at seven combined sewer outfalls in the Rouge River watershed owned by the City of Detroit. During wet weather events, these gates have eliminated CSO discharges during small rain events by maximizing the use of in-system storage. Other measures have not required significant capital expenditures.

Each CSO community with uncontrolled CSOs has taken measures to prevent the occurrence of dry weather overflows. Each CSO community reports CSO discharges to the Michigan Department of Environmental Quality (MDEQ), which provides public notification by posting the reported information on a website. State law also requires CSO permittees to self-report to downstream communities and one major local newspaper.

LTCPs are implemented in three phases as established through NPDES permits:

- Phase I— elimination of raw sewage and the protection of public health for approximately 40 percent of the combined sewer area.
- Phase II— elimination of raw sewage and the protection of public health for the remaining combined sewer area.
- Phase III— meet water quality standards in the Rouge River.

Under Phase I, six communities separated their sewers and nine communities constructed a total of 10 retention treatment basins. Each of these retention treatment basins is sized for different design storms, and several employ innovative technologies. These facilities also incorporate a variety of additional features or variations in compartment sizing and sequencing in order to improve their effectiveness. The retention treatment basins capture most wet weather flows for later conveyance to the Detroit POTW for treatment. Flows from very large wet weather events that are not captured by the retention treatment basins receive screening, skimming, settling, and disinfection prior to discharge. These projects have effectively eliminated or controlled the discharge of untreated sewage from approximately half of the watershed's CSOs.

Working with the CSO communities, MDEQ established rigorous "Criteria for Success in CSO Treatment" to evaluate whether the CSO basins met the Phase I goals of elimination of raw sewage discharges and protection of public health. MDEQ established a work group that included state personnel, CSO permittees and consultants to assess the evaluation process.

A detailed evaluation study of the CSO retention treatment basins constructed thus far is underway to examine the performance of the facilities and the water quality impacts of their discharges. Basin influent and effluent flow and water quality are monitored for at least two years at each facility. In addition, river monitoring is performed to identify benefits associated with CSO control. The results of the evaluation study, coupled with efforts to control storm water and other pollution sources in the watershed, will provide the basis for the Phase II and Phase III CSO control program to address the remaining water quality issues. The information gained from the evaluation of design storms and control technologies will also be useful nationwide in determining cost effective CSO controls to meet water quality standards.

It is important to note that MDEQ has concluded that all six of the CSO treatment facilities that have completed data collection are currently meeting the Phase I criteria of the elimination of raw sewage and the protection of public health. In addition, the first three CSO basins evaluated are achieving the Phase III goal of meeting water quality standards at times of discharge, except for meeting the yet-to-be-evaluated total residual chlorine standard.

Costs and Financing

CSO-related capital expenditures are funded by a combination of federal and local funding sources, with some communities using state revolving loan funds. Local funding is being generated by sewer rate increases, or issuance of general obligation bonds that are repaid through property taxes. Capital expenditures for Phase I CSO projects in the watershed total about $350 million, with another $5 million spent annually on CSO-related O&M. Another $1.3 billion of capital expenditure is needed to complete implementation of LTCP facilities in the watershed, along with $15 million annually for additional CSO-related O&M.

Water Quality Issues

Before implementation of CSO controls began in 1994, excursions of the water quality standards for dissolved oxygen and bacteria occurred frequently in CSO-impacted reaches of the Rouge River and its tributaries. Evidence of raw sewage was visible in the river during wet weather events, and visible on river bank vegetation and woody debris after events. Implementation of the NMC, the Phase I CSO control projects, and other watershed management measures has resulted in significant improvement in river conditions. In river reaches now free of uncontrolled CSOs, exceedances of the dissolved oxygen standard have been almost eliminated, the amount of bacteria in the river during wet weather events has been greatly reduced, and visible evidence of raw sewage has been eliminated. However, completion of the LTCP will not result in complete compliance with water quality standards due to other pollution sources within the watershed.

Enforcement Issues

Several enforcement actions have been taken by MDEQ relative to the Phase I CSO control projects:

- One project was aborted due to construction problems, and MDEQ issued an administrative consent order requiring the community to complete a revised CSO control project. This project is currently under design.
- One project is not yet complete due to construction delays and an enforcement action was initiated to ensure its timely completion.
- An amended federal consent judgment was issued in part for the failure to complete three projects on schedule. These projects are now complete and operational.

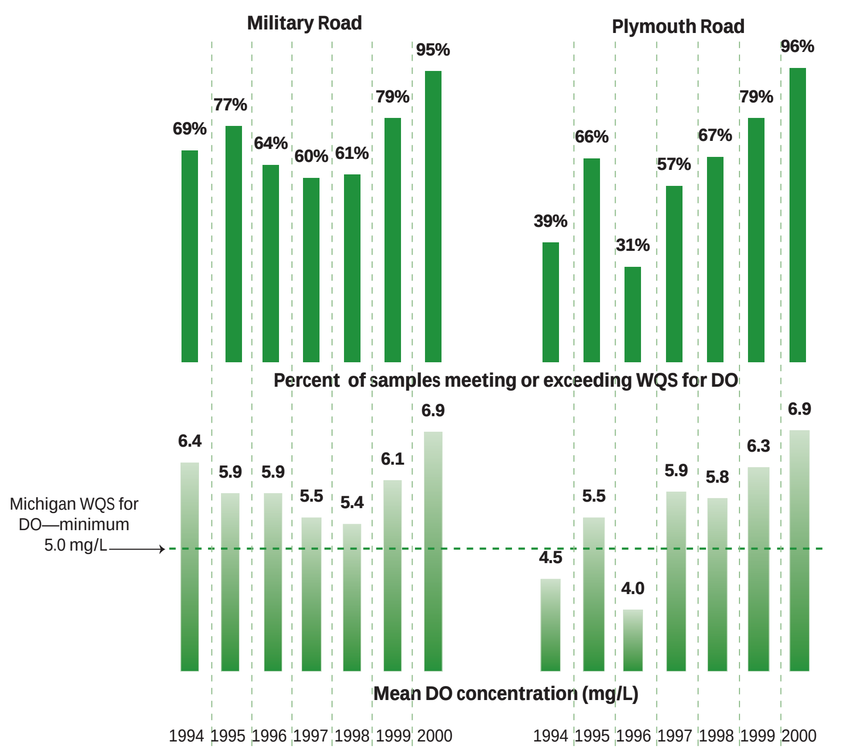
Results

Some of the key results and accomplishments of the Rouge Project are as follows:

- About 30 miles of the Rouge River that were CSO-impacted in 1994 are now completely free of uncontrolled CSO discharges.
- Two years of performance monitoring data for the first six CSO basins shows the following:
  - About 72 percent (933 million gallons) of the combined sewage that previously went to the river was captured and treated at the Detroit POTW.
  - Untreated overflows in excess of 50 times per year have been reduced to treated overflows occurring one to seven times per year.
  - Even in areas with remaining uncontrolled CSOs upstream, continuous dissolved oxygen data are showing dramatic improvements in river conditions due to upstream CSO control projects and other watershed management measures/changes.

As shown in the figure below, on the Main Rouge River (Military Road monitoring station) the percent of continuous dissolved oxygen levels meeting or exceeding water

Dissolved Oxygen Increases at Main and Lower Rouge Monitoring Stations



quality standards increased from less than 60 percent in 1998 to 95 percent in 2000. On the Lower Rouge River (Plymouth Road monitoring station) the percent of continuous dissolved oxygen levels at or above water quality standards increased from less than 30 percent in 1994 to 96 percent in 2000 (see figure, below).

Work groups have reached consensus with MDEQ that the first six CSO retention treatment basins evaluated are meeting MDEQ-defined criteria for protecting public health and eliminating raw sewage. Additionally, work groups have reached consensus with MDEQ that the first three CSO basins evaluated are achieving MDEQ-defined criteria for achieving water quality standards at times of discharge, except for meeting the yet-to-be-evaluated total residual chlorine standard.

In addition to the above, the aesthetics of the Rouge River and its tributaries are greatly improved, and there is evidence of aquatic habitat improvement. Recreational use of the Rouge River is increasing.

References

Ed Kluitenberg, Applied Science, Inc. Personal communication with Limno-Tech, Inc. staff on details of the combined sewer overflow plan and program. Summer 2001.

Rouge River Project Web Site (http://www.wcdoe.org/rougeriver/).

Community Case Study — Saginaw, MI—Region 5

Number of CSO Outfalls

16

Combined Sewer Service Area

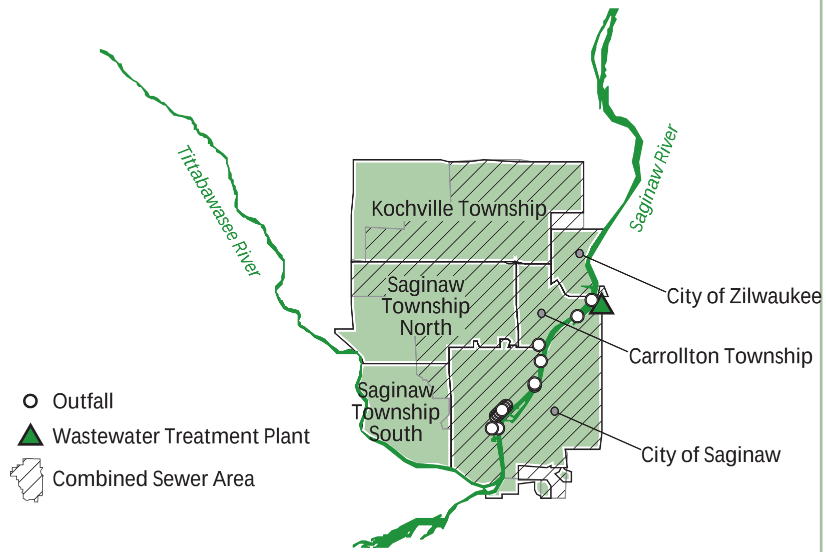
16.1 square miles

Wastewater Treatment Capacity

32 mgd (secondary)

Receiving Water(s)

Saginaw River



Controls

- Retention treatment basins with disinfection facilities have been the focus of Saginaw's CSO control efforts.
- Construction of relief sewers was initiated to provide capacity to bring wet weather flows to the retention facilities.
- Saginaw also considered sewer separation but found the costs to be prohibitive.

Program Highlights

- 20 of 36 CSO outfalls have been eliminated as part of Saginaw's CSO Control Program.
- Seven of the remaining CSO outfalls have facilities that provide primary treatment and disinfection.
- Saginaw continues to monitor upstream and downstream bacteria levels during CSO discharge events and report the results to both the state and local county health departments.

Background on Saginaw CSOs

The City of Saginaw is located in the east central portion of Michigan's lower peninsula. The city lies within the Saginaw River Watershed, and the river runs through the city for approximately five miles. The Saginaw River flows 15 miles northward from the City of Saginaw into Saginaw Bay, in the southeastern section of Lake Huron. Saginaw Bay is widely used for fishing, boating and recreation. Both the Saginaw River and Saginaw Bay have been defined as two of 42 "areas of concern" by the International Joint Commission on the Great Lakes.

Saginaw owns and operates a wastewater treatment plant (WWTP) and collection system that serve Saginaw as well as the neighboring communities of Zilwaukee, Carrolton Township, Kochville Township, and portions of Saginaw Township. Much of the collection system is combined with CSO outfalls that discharge during wet weather into the Saginaw River. Saginaw's WWTP began as a primary treatment facility in 1952. Secondary treatment facilities and phosphorus removal equipment were added to the plant in 1975. The WWTP began treating wastewater of the neighboring communities in 1991. (Vasold, 2001).

System Characterization

The combined sewer service area covers approximately 10,325 acres. Only a small portion of Saginaw (200 acres) is served by separate sewers. There were 36 permitted CSO outfalls in Saginaw in 1990, consisting of 31 sewage regulator chambers and five storm water and combined sewer pumping station relief points. The number of permitted CSO outfalls was reduced to 16 by 2000, and includes seven CSO outfalls where primary treatment and disinfection are provided.

The Saginaw WWTP has a 32 mgd capacity during dry weather and 70 mgd during wet weather. Seven CSO retention treatment basins (RTBs) have been constructed to provide primary treatment and disinfection, as shown below.

Facility	Capacity (mgd)	Treatment Methods	Discharge Volume (mgd)	Year In Service	Cost (Millions)
Hancock	3.5	Primary sed, skimming, disinfection	51.3	1977	$6.6
Weiss	9.5	Swirl conc, disinfection	248.0	1993	$16.9
Webber	3.6	Primary sed, skimming, disinfection	34.8	1994	$6.6
Emerson	5.0	Primary sed, skimming, disinfection	33.4	1994	$15.9
Salt/Fraser	2.8	Primary sed, skimming, disinfection	2.0	1995	$22.9
Fitzhugh	1.2	Primary sed, skimming, disinfection	2.8	1994	$4.8
14th Street	6.8	Skimming, settling, vortex sep, disinfection	36.6	1992	$8.5

The pollutant removal effectiveness varied among the RTBs, as shown below.

Facility Name	Volume	BOD	TSS	Phosphorus	Ammonia
Hancock	22%	50%	51%	40%	39%
Weiss	29%	54%	77%	55%	68%
Webber	38%	52%	61%	33%	62%
Emerson	36%	57%	39%	38%	67%
Salt/Fraser	48%	60%	68%	53%	73%
Fitzhugh	42%	57%	84%	56%	85%
14th Street	59%	83%	79%	76%	80%

Status of Implementation

Saginaw considered two alternatives for control of its CSOs: sewer separation and storage and treatment. A cost comparison of the two alternatives was conducted in 1990, and the results are as follows:

Alternative (Millions)	Construction Cost (Millions)	Present Worth (Millions)	Annual Equivalent Cost
Sewer Separation	$309.8	$285.1	$31.0
Storage and Treatment	$170.8	$78.1	$18.0

The storage and treatment alternative was selected because of the cost advantage. This alternative was then divided into Phases A, B and C. Phases A and B have been completed, resulting in the elimination of all untreated CSOs.

Phase	CSO Control(s)
A	Storage for the two-inch, one-hour storm event Two-thirds of storage volume will be provided for settling, skimming, and disinfection
B	Additional collector sewers and retention basin capacity, in order to eliminate all untreated combined sewer overflows
C*	Additional retention basin capacity to meet the MDEQ definition of adequate treatment (total retention of the one-year, one-hour rainfall event and one-half hour detention of the ten-year, one-hour event.)

*Note: Whether or not Phase C will be required will be determined by the MDEQ after review of a facilities evaluation report. The determination will be based on whether additional controls are necessary to comply with water quality standards.

Nine Minimum Controls

Saginaw has implemented the NMC. There are no dry weather overflows in Saginaw's system, except in emergency situations. When CSO discharges occur, state and county officials, as well as local media are contacted as part of the city's notification procedure. Within 24 hours, volume estimates are furnished, and a written report is supplied within five days of the conclusion of the overflow event. Upstream and downstream *E. Coli* levels are monitored during CSO discharge events, and reported to the state and to the Bay and Saginaw County Health Departments.

Long Term Control Plan

Saginaw has adopted a modified version of the presumption approach in its LTCP. Phase C of the CSO Control Plan is to construct additional capacity in the retention and treatment basins to meet Michigan's presumption approach. Twenty of 36 CSO outfalls have been eliminated.

Capital costs for Phase A were approximately $80.7 million. Capital costs for Phase B were approximately $24.5 million. The primary funding mechanism employed by Saginaw to cover the costs of CSO control was the Michigan Clean Water State Revolving Fund. The average household user cost in Saginaw is currently approximately $243 per year (debt service, operation, maintenance, and replacement). Phase B projects are anticipated to increase costs by approximately $32 per year. Estimated costs for Phase C projects are $65.6 million.

Results and Accomplishments

It was estimated in 1990 that nearly three billion gallons per year of untreated CSO was discharged by the City of Saginaw. Implementation of Phase A and Phase B CSO controls are estimated to have reduced the volume of overflow to 760 million gallons per year, a 74 percent reduction. Direct discharge of untreated combined sewage has been eliminated under virtually all circumstances with the completion of Phase B CSO controls.

The City of Saginaw received a first place award in EPA's National CSO Control Program Excellence Awards in 1998 for progress made in implementing its CSO Control Program.

References

John Vasold, Saginaw Wastewater Treatment Division, Saginaw, MI. Personal communication with Limno-Tech, Inc. staff on details of the combined sewer overflow plan and program. Summer 2001.

Community Case Study — San Francisco, CA—Region 9

Number of CSO Outfalls

43 (originally)
36 (currently)

Combined Sewer Service Area

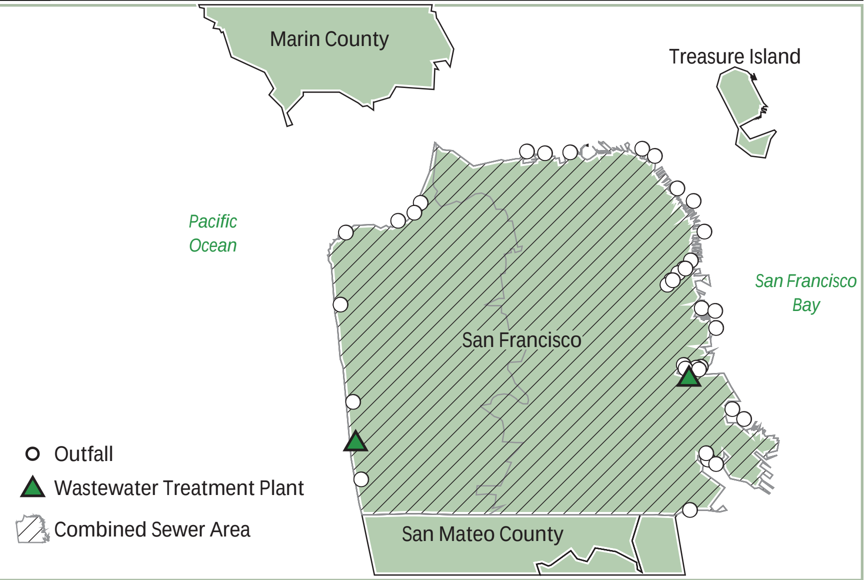
49 square miles

Wastewater Treatment Capacity

272 mgd (primary)
194 mgd (secondary)

Receiving Water(s)

Islais Creek, San Francisco Bay, Pacific Ocean



Controls

- San Francisco completed implementation of its LTCP in 1997; initial CSO control began in the early 1970s.
- Wet weather treatment facilities provide 272 mgd of primary treatment and disinfection for wet weather flows.
- Storage and transport structures hold flow until treatment plant capacity becomes available.

Photo: Islais Creek CSO Wet Weather Treatment and Storage Facility
Courtesy San Francisco PUC

Program Highlights

- CSO outfalls have been reduced from 43 to 36.
- CSO events have been reduced by over 75 percent, and CSO volume by 81 percent.
- An estimated 94 percent reduction in beach postings has occurred since implementation of CSO controls.
- CSO control has improved City assets and enhanced water quality of nearshore areas of the Bay and Ocean.

Background on San Francisco CSOs

The combined sewer service area of the City and County of San Francisco is approximately 31,360 acres and serves an estimated population of 800,000. There are no significant separated sewer service areas within the city. There are six main drainage basins within the service area and approximately 898 miles of combined sewer.

Prior to the implementation of CSO controls, an average of 7.5 billion gallons of CSO discharged during the wet weather season (October to April) each year. The overflow frequency was approximately 58 times per year, and there were 43 CSO outfalls. All of the CSOs discharged into marine waters.

The city and County of San Francisco own and operate three wastewater treatment plants in addition to the storage/transport facilities constructed for CSO control. The Southeast Water Pollution Control Plant (WPCP) is the city's largest wastewater treatment plant and has a peak secondary treatment capacity of 150 mgd. The plant discharges through an outfall to San Francisco Bay. The outfall has a capacity of 100 mgd, and flows in excess of 100 mgd are discharged to Islais Creek, a saltwater embayment. The Southeast WPCP was expanded in 1982 to provide a wet weather capacity of 250 mgd for peak wet weather flows. This was achieved using the 150 mgd of available secondary treatment capacity and 100 mgd of primary treatment capacity.

The North Point Wet Weather Facilities serves an area of approximately 6,500 acres in the northeastern part of the city. The facilities provide primary treatment (i.e., screening and settling), disinfection, and dechlorination of combined wet weather flows up to 150 mgd.

The Oceanside WPCP has a peak secondary treatment capacity of 43 mgd and a wet weather treatment capacity of 65 mgd. The capacities of the treatment facilities used by San Francisco to treat dry weather and wet weather flows are summarized in the table below.

Treatment Plant	Secondary Capacity (mgd)	Primary Capacity (mgd)	Peak Flow Capacity (mgd)
Southeast WPCP	150	100	250
North Point Wet Weather Facilities	None	150	150
Oceanside WPCP	43	22	65
Total	**193**	**272**	**465**

Status of Implementation

CSO Planning History

Planning for CSO control began in the early-1970s. The city Department of Public Works assessed various measures to upgrade treatment and control CSOs between 1970 and 1974. The Wastewater Master Plan was approved in concept by the San Francisco Board of Supervisors in January 1975. Based upon this planning effort, the San Francisco Regional Water Quality Control Board issued the city its first NPDES permit for the CSO structures. This permit was issued in the mid-1970s and set monitoring requirements and tentative control levels at some of the structures, as well as requiring additional studies of CSO control measures. In late 1978 and 1979, the permits were revised and the required CSO control levels were established based upon cost-benefit analyses.

System Characterization

The revised permits allowed a long-term average of 10 overflows per year where the shoreline usage is predominantly industrial and maritime, between eight and four overflows per year in areas where water contact recreation occurs, and only one overflow per year in an area where there are shellfish beds. The permits also require that:

- Wet weather treatment facilities are at maximum capacity before CSOs are allowed.
- Industrial source control and BMPs to control nonpoint source pollution must be implemented.
- Floatables are contained in the storage/transport structures.
- Treatment plant effluent, CSOs, and receiving waters are monitored for pollutants.
- Beaches are posted following CSO events.

To intercept the flows, a series of large underground storage and transport structures (referred to as storage/transport boxes) were constructed along San Francisco's shoreline. Gravity and pumping are used to transport the stored wet weather flows to the treatment plants as treatment plant capacity becomes available. In addition to these storage/transport boxes, the treatment plants were upgraded to expand the secondary and wet weather treatment capacities.

The system is designed and operated so that all dry weather flows are kept in the sewer system and routed to either the Southeast WPCP or the Oceanside WPCP for treatment. In wet weather the storage/transport boxes allow primary sedimentation to occur and are designed to remove floatables and reduce suspended solids concentration by approximately 30 percent. The capacities of these structures are summarized in the accompanying table. After a rain event, the settled solids are conveyed to the wastewater treatment plants. Therefore, all overflows from the storage/transport boxes receive some treatment prior to discharge through the outfalls.

WPCP System	Storage/Transport Structure	Capacity (mgd)
Westside Core System	Westside	50.0
	Richmond	10.0
	Lake Merced	10.0
Bayside Core System	Northshore	17.5
	Mariposa	0.7
	Islais Creek	37.0
	Yosemite/Fitch	11.5
	Sunnydale	5.7
	Channel	28.0
Total		**170.4**

The Bayside Core System consists of seven miles of underground storage/transport boxes. These boxes drain to major pump stations where all dry weather flows are pumped to the Southeast WPCP for treatment before being discharged into San Francisco Bay. During wet weather, the North Point Wet Weather Facilities are brought online. Flows in the boxes exceeding the combined wet weather capacity of the Southeast WPCP and the North Point Wet Weather Facilities receive partial treatment in the boxes before discharge.

The Westside Core System consists of a 2.5 mile long storage/transport box, the Oceanside WPCP, and the Southwest Ocean Outfall. The city has also constructed consolidation conduits, tunnels, and new pump stations to intercept overflows and divert them to the storage/transport boxes.

In addition to the massive capital improvements, the city embarked on a program of toxics source control and pollution prevention. The Water Pollution Prevention Program was developed in response to several state and federal permits, orders, and waste minimization strategies. It consists of best management practices targeting educational and technical outreach, increased inspection and sampling of non-traditional pollutant sources, mandated waste minimization, and storm water pollution prevention plans.

Nine Minimum Controls

San Francisco has implemented the NMC. Wet weather-related monitoring activities include characterization of CSO discharges for various chemical constituents. Following a CSO event beaches are posted as not meeting state recreational water contact standards. Local surf shops and swim clubs are contacted and a toll free recreational water quality hotline is available to the public. The city is also in the process of developing access to EPA's BEACH Watch website.

Long Term Control Plan

San Francisco completed implementation of its LTCP in 1997 and the planned capital improvements for controlling CSOs to the allowed number of annual overflows. The city's LTCP gave priority to eliminating discharges to sensitive areas; a CSO outfall at Baker

Beach in the Golden Gate National Recreational Area has been eliminated given the sensitivity of the habitat and potential human exposure.

Costs and Financing

The total capital costs associated with completing the LTCP were approximately $1.45 billion. The annual CSO-related O&M costs are approximately $20 million. Nearly $700 million in federal and state grants were received by San Francisco to assist in the planning, design, and construction of the CSO control system. The remaining $750 million, raised by revenue bonds and to be repaid by sewer rater, were city funds.

The North Point Wet Weather Facilities, which are more than 50 years old, are in need of improvement. Certain equipment is obsolete and some spare parts are no longer available on the market. Pollutant removal is less than optimal and in some instances discharges approach current effluent limits. With the consideration of future expansion, an upgrade is being planned for the facilities. The project involves: 1) upgrading primary sedimentation tanks and equipment with high rate clarification units, 2) replacing chlorine-based disinfection system with a more environmentally-friendly, medium pressure, ultraviolet radiation disinfection system capable of achieving current NPDES fecal coliform standard, and 3) upgrading ancillary equipment (pre-treatment, pumps, piping, electrical/instrumentation) to meet needs of treatment processes. The upgrade is projected to cost $38 million.

There are also plans to increase the capacity of the outfalls in conjunction with the North Point upgrades described above. The outfalls were constructed in the 1950's and the diffusers were added in the 1970's. Both are necessary to meet the discharge permit requirements of a minimum 10:1 dilution. Since the North Point Facilities are used for wet weather treatment only, and are not always in operation, barnacles and crustaceans inhabit the outfall system and have created blockages, thereby reducing its capacity and efficiency. The projected cost for increasing the capacity of the outfalls from 150 mgd to 300 mgd is $22 million.

Depending on the outcome of current negotiations between the city and the Navy, the city may be responsible for system upgrades and expansion at Hunters Point and Treasure Island. San Francisco's remaining needs also depend on potential changes to water quality standards previously discussed.

Water Quality Issues

Since 1972 the city has conducted ongoing sampling to evaluate the impacts of CSO discharges and to assess the environmental improvements gained from CSO control. On the Westside, where prior to the program as much as 83% of the storm flows were discharged untreated at the Pacific Ocean shoreline, only 13% of the storm flows are discharged at the shoreline and all of this overflow receives partial treatment.

Although San Francisco's LTCP has been completely implemented there are unresolved issues regarding water quality standards compliance. The state anticipates that it will be reviewing the appropriateness of the water quality standards in the near future. The city may have to implement additional programs depending on the outcome of that review.

Results

CSO volume and frequency have been reduced greatly since CSO controls have been implemented. Citywide pollutant reductions resulting from the city's LTCP are summarized as follows:

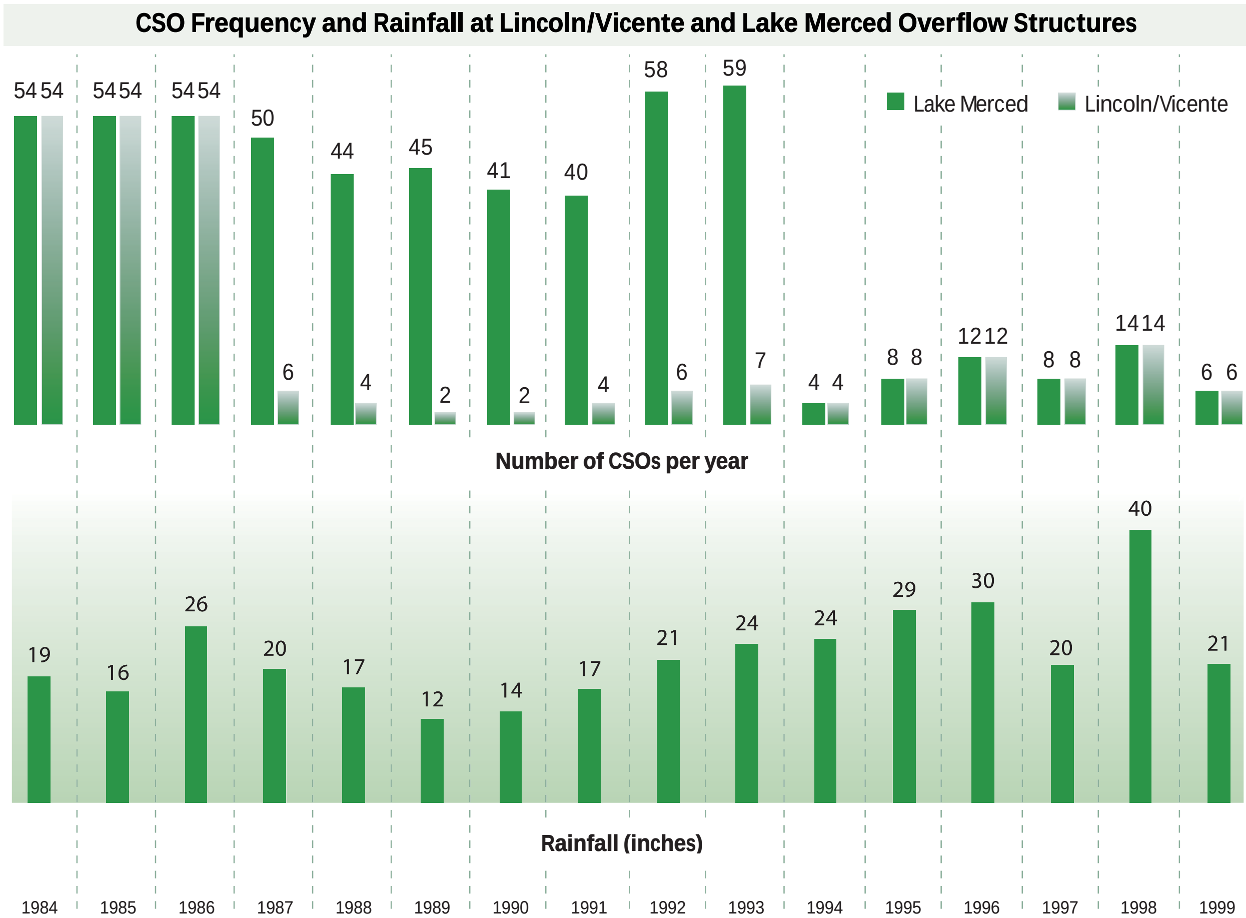
Item	Before Control	After Control	% Reduction
Number of CSO events	58 - 80	1-10	98-75
Annual CSO Volume (MG)	7,500	1,350	81
Suspended Solids Discharge (tons/yr)	3,550	450	87
BOD_5 Discharge (tons/year)	2,700	300	89
Beach Postings (days/year)	200	12	94

San Francisco developed its LTCP in conjunction with the regulatory agencies and started to implement the plan in 1974. Within 20 years the following systems were complete: (1) the Westside system, which reduced overflows to eight times per year into the Pacific Ocean along the central portion of Ocean Beach; (2) the Northshore system, which reduced overflows to four times per year along the northshore of the city the Golden Gate and Bay Bridges; (3) the Channel system, which reduced overflows to 10 times per year from the Bay Bridge to Mission Creek; and (4) the Sunnydale/Yosemite system, which reduced overflows to one time per year south of Islais Creek to the southern city boundary.

In 1994, the Lake Merced Transport system was tied to the Westside system, which further reduced overflows to the Pacific Ocean from the southwestern section of San Francisco. Shortly thereafter the Islais Creek system was completed, which reduced overflows to 10 times per year from Mission Creek to Islais Creek along the eastern boundary of the city. In 1997, the Richmond Transport connected flow from the northwestern edge of the city to the Westside system, diverting flow that previously spilled onto Baker and China Beaches.

Prior to CSO control implementation, San Francisco beaches were routinely posted from October to April during the wet weather season for not complying with state recreational water contact standards. Rainfall in excess of 0.02 inches per hour resulted in CSOs around the entire city. As CSO control structures were put in service, the number of CSOs to San Francisco shoreline areas have been reduced as described above. The number of CSOs that occur is dependent upon the amount of annual rainfall and the duration and intensity of each rainfall event.

From 1994 through 1996, a significant portion of control structures were in place and the number of days the beaches were posted ranged from 196 to 217, while rainfall ranged from 23.7 to 26.3 inches. In 1997, the first partial year of complete CSO control implementation, the number of days beaches were posted dropped to 54, but rainfall was only 19.1 inches. In 1998, the first complete year of full implementation, the number of days beaches were posted dropped to 48 and rainfall was significantly higher, measuring 33.5 inches. Since 1998, annual rainfall in San Francisco has ranged from 22 to 27 inches and the days that beaches were posted decreased to between eight and 15 days. In recent years, beaches remain posted only while sampling indicates that bacteria concentrations are above state bacteria standards. This is typically only a period of one to three days. An estimated 94% reduction in beach postings has occurred due to implementation of CSO controls. As shown in the following figure, these reductions have been achieved during both wet and dry years.



This reduction in the numbers and volume of CSO events during the past 25 years has facilitated the transition of San Francisco's coastline from industrial uses to tourist, recreational, and residential uses by improving and enhancing the water quality of nearshore areas of the bay and ocean. The continuing economic development of the Fisherman's Wharf area south to Pac Bell Park and the water contact recreation enjoyed at Crissy Field, Fort Point, Baker, and Ocean Beaches (all within the Golden Gate National Recreational Area) have been supported in part by the control and treatment of combined sewer overflows (Lavelle, 2001).

San Francisco Bay has been listed for several pollutants under CWA Section 303(d). The listing has resulted in a need for developing TMDLs for certain pollutants, such as copper and nickel. The outcome of TMDLs may require further control measures for CSOs. These control measures have not been determined at this time.

References

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Community Case Study — South Portland, ME—Region 1

Number of CSO Outfalls

35 (originally)

25 (currently)

Combined Sewer Service Area

12 square miles

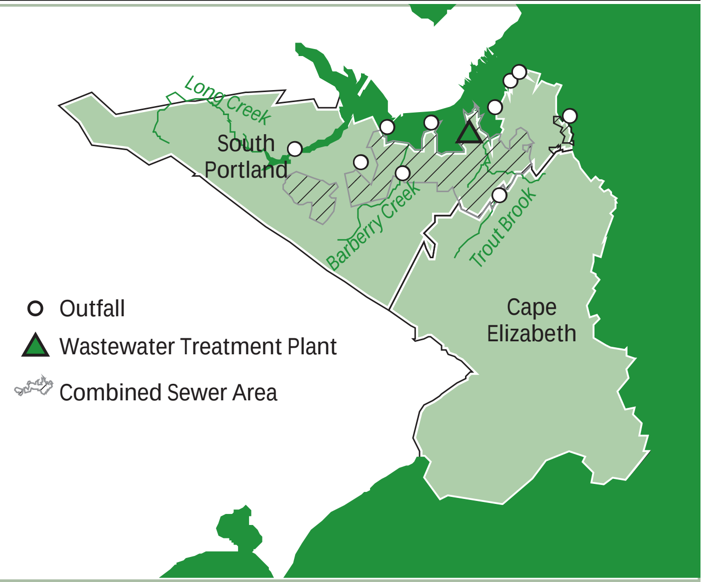
Wastewater Treatment Capacity

56 mgd (primary)

22.9 mgd (secondary)

Receiving Water(s)

Fore River, Casco Bay



Controls

- South Portland's program has relied on sewer separation, removing private inflow sources (roof leaders and sump pumps), expansion of wet weather treatment capacity, and upgrading sewer lines.
- Technical advice and financial incentives have been used to encourage inflow control.
- Wet weather wastewater treatment plant capacity was expanded from 12 mgd to 56 mgd.

Photo: Lighthouse at Portland Head on Casco Bay.
Photodisc

Program Highlights

- 25 of 35 CSO outfalls have been eliminated.
- 80 percent reduction in CSO volume was achieved between 1988 and 1993.
- Real time flow monitoring is used to quantify flows. All CSO outfalls are continually monitored.
- The Friends of Casco Bay have recognized South Portland for the positive impact of its CSO control program on the Bay.

Background on South Portland CSOs

South Portland has a population of 22,300 and is located in southern coastal Maine. South Portland is served by a CSS which is comprised of 16.6 miles of combined sewer pipes that cover an area of 7,680 acres. CSOs in the system discharge directly (or indirectly via ponds, creeks, and brooks) to the Fore River and Casco Bay. Both of these water bodies are classified by the Maine Department of Environmental Protection (DEP) for swimming, fishing, and shellfish harvesting. Casco Bay was also designated by EPA as an Estuary of National Significance in 1987. It is an important economic resource for Maine, supporting commercial fishing, tourism, shipping, manufacturing, and service businesses.

Status of Implementation

Characterization

South Portland initiated their CSO Control program in 1988. City staff inventoried, numbered and mapped all of the sewer pipes, catch basins, and manholes. Thirty-five CSO outfalls were identified. Inflow and infiltration was high in the city's aging sewer system. The average age of the system was approximately 50 years, and the oldest sewer pipes date to the 1880s (City of South Portland 1992 and 1993).

South Portland installed an extensive system of real-time flow monitoring equipment to characterize their CSS and existing CSOs. All CSO outfalls in the system are continuously monitored, and the duration, overflow rate, total volume, and time of day of each CSO is recorded. South Portland also maintains rain gauges to be able to correlate overflow and precipitation events. Flow monitoring has provided many benefits for South Portland's CSO control program. The real-time flow data: (1) provide basic information for the city to understand CSS performance, (2) enable the progress of the CSO control program to be tracked, (3) produce information for comparison of CSO control alternatives, and (4) serve as an important component of compliance monitoring. South Portland has maintained rainfall records and flow records from the CSO outfalls and pump stations since 1992. Other monitoring efforts related to the CSO program include collection of bacteria data (enterococci) at swimming beaches. These efforts have enabled South Portland to collect site-specific data on existing CSOs, and to calculate pollutant loadings and receiving water impacts. This comprehensive monitoring program has also aided the development of South Portland's LTCP.

Nine Minimum Controls

The NMC were required for South Portland as part of the DEP CSO Discharge License, and an enforcement action (consent agreement with EPA Region 1, dated January 28, 1992). South Portland has been recognized by the DEP for its implementation and documentation of the NMC, considered to be one of the best of 44 Maine CSO communities (City of South Portland, 1997).

Proper O&M was recognized to be an important component of CSO control. The city's sewer maintenance division is responsible for cleaning and inspection of the collection system. In addition, they maintain an emergency on-call system to quickly identify, eliminate, or mitigate any problems that might arise. No dry weather overflows occurred in 1999. In the previous three years, dry weather overflows occurred due to power or equipment failures that have since been corrected with backup power arrangements. Because South Portland continuously monitors flows at all CSO outfalls, dry weather overflows are quickly discovered and eliminated.

Signs are placed at all CSO locations to inform the public of possible wet-weather hazards. The signs are regularly checked and replaced if damaged or missing. The Willard Beach outfall is recognized as a sensitive area for CSO activity because it is a public swimming area. Bacteria testing has been performed at the outfall twice weekly during the summer since 1991. While beach closings have occurred, none corresponded directly with CSO discharges.

South Portland has implemented an aggressive program to reduce inflow to the CSS. Homes and commercial establishments with roof leaders and basement sump pumps directly connected to the CSS were identified. South Portland provided technical and financial support to owners to have roof leaders and sump pumps redirected from the CSS. A summary of CSO source control measures implemented by South Portland follows.

Source Control Activity and Progress as of 1999	Purpose
Roof Leader Disconnection—257 homes	Stormwater Inflow Reduction
Sump Pump Removal—213 removed	Stormwater Inflow Reduction
Catch Basin Cleaning—460 tons debris annually	Pollution Prevention
Street Sweeping—2,000 cy debris removed annually	Pollution Prevention
Annual community hazardous waste collection	Pollution Prevention

Long Term Control Plan

South Portland has been implementing CSO controls since 1988. The LTCP is based upon the demonstration approach. Priority has been given to eliminating the CSO discharges near the bathing beach, a sensitive area. Sewer separation, adjustment of weir heights, upgrading of pumps stations, upgrading of POTW capacity, and many other in-system controls have contributed to substantial reductions in the number of CSO outfalls and the volume of CSO discharge. The types of in-system control measures implemented since 1988 by South Portland are listed below.

System Controls Implemented as of 1999	Type
Infiltration/inflow control	Collection System Optimization and Control
Real-time flow control (50% overflow decrease realized by adjusting weirs)	Collection System Optimization and Control
Sewer cleaning	Collection System Optimization and Control
Manhole/pump station maintenance	Collection System Optimization and Control
Sewer rehabilitation	Collection System Optimization and Control
Sewer separation (680 acres separated between 1986-1998)	Collection System Optimization and Control
Outfall elimination	Collection System Optimization and Control
In-line netting	Floatables Control
Baffles (installed at 11 locations in CSS)	Floatables Control
Screening improvements at discharge point	Floatables Control
In-line storage (weirs adjusted to maximize in-line storage)	Storage (In-Line and Off-Line)
Upgraded pump stations (6 pump stations upgraded)	Storage (In-Line and Off-Line)
Upgraded POTW capacity (with additional wet weather primaries)	Storage (In-Line and Off-Line)

Costs and Financing

South Portland has spent over $9 million to control CSOs. Most of this has been financed through voter-approved bonding. Costs for sewer separation of 680 acres of the combined system were approximately $6 million and the separation projects scheduled over 10 years. Capital costs for the POTW upgrade were $9.2 million, but only a small portion of this is associated with CSO control. The cost to upgrade six pump stations was $1.3 million. Capital costs for planned LTCP controls are $13.8 million, including $5 million for partial sewer separation (to be complete by December 2005). Annual O&M costs are approximately $350,000 per year.

Enforcement Issues

South Portland was the first non-National Municipal Policy referral in EPA Region 1 in which the EPA sought relief for wet weather discharges only. As part of the consent agreement (entered into court on April 16, 1992), South Portland paid $30,000 in penalties for violations of the CWA and its Maine CSO Discharge License. The consent agreement required, among other things, that yearly CSO progress reports be submitted to the DEP.

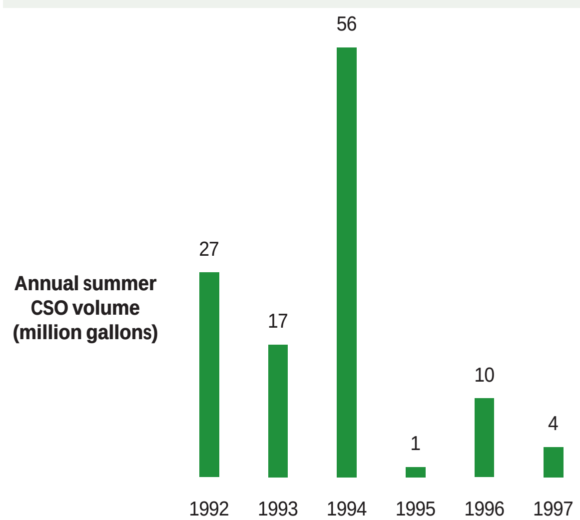
Results

South Portland initiated its CSO control program in 1988. The city's initial CSO master plan focused on maximizing flow to the POTW. This involved increasing pump station capacity, maximizing flow (conveyance capacity) to the treatment plant, and upgrading treatment and storage capacity at the plant. The current CSO control program primarily relies upon separating and upgrading (replacing) sewers and removing private inflow sources through roof leader and sump pump redirection. The removal of inflow and infiltration sources has eliminated approximately 700 million gallons per year from entering the CSS. Overall, South Portland had achieved an 80 percent reduction in total CSO volumes in an average rainfall year by 1993. In addition, 25 of 35 CSO outfalls have been eliminated through sewer separation and other system improvements.

Prior to the POTW upgrade, 60 percent of the total CSO volume was discharged at the plant. Secondary treatment capacity at the POTW was upgraded from 12 to 22.9 mgd. Wet weather flows in excess of the upgraded secondary treatment capacity are diverted to empty storage/treatment tanks for primary treatment. CSO bypass of secondary treatment is permitted under peak flow conditions. In total, maximum treatment capacity was expanded to approximately 56 mgd (22.9 mgd secondary, plus 33 mgd of primary treatment). The wet weather treatment capacity has not been exceeded since the upgrade.

South Portland has also observed a reduction in summer CSOs. Monitored volumes for summer CSOs from 1992 through 1997 are shown in the figure at right. South Portland has been recognized by the Friends of Casco Bay for its positive impact on the Bay.

Summer CSO Volume Reductions, 1992—1997



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City of South Portland, Maine. 1993. *Combined Sewer Overflow Facilities Plan*. South Portland, ME.

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Pineo, David, Engineering Department, City of South Portland, ME. Personal communication with Limno-Tech, Inc. staff on details of the combined sewer overflow plan and program. Summer 2001.

Number of CSO Outfalls

60

Combined Sewer Service Area

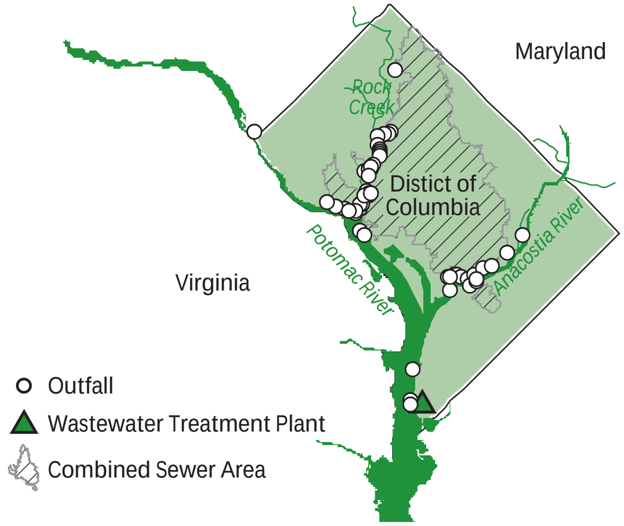
20.2 square miles

Wastewater Treatment Capacity

1,076 (primary)
740 mgd (secondary)
370 mgd (advanced)

Receiving Water(s)

Rock Creek, Anacostia River, Potomac River



Controls

- Phase I CSO Controls were completed in 1991 and featured the Northeast Boundary Swirl Facility, inflatable dams for in-system storage, expanded pumping capacity, and expanded wet weather capacity at the Advanced Wastewater Treatment Plant at Blue Plains.
- NMC measures include regular inspections of critical facilities such as outfalls, regulators, pump stations and tide gates; maximizing storage in the collection system through use of inflatable dams; and pretreatment of industrial flows.

Photo: Potomac River in Georgetown, Washington, D.C.
Courtesy of Greeley & Hansen Engineers, Inc.

Program Highlights

- NMCs were implemented and documented in 1996 with updates in 1999 and 2000.
- The draft LTCP was submitted in June 2001 to EPA Region 3 and the DC Department of Health, and is based upon the demonstration approach.
- The recommended CSO control program includes three storage tunnels, pump station rehabilitation, regulator improvements, and low impact development retrofits.
- The estimated cost to implement the recommended CSO controls is approximately $1 billion.
- Compliance with the requirements of the CWA will not be accomplished unless other sources are controlled in conjunction with CSO control.
- Incorporation of wet weather provisions in water quality standards has been requested.

Background on Washington, D.C. CSOs

The District of Columbia Water and Sewer Authority (WASA) operates a wastewater collection system consisting of separate and combined sewers. Approximately one-third of the District, or 12,955 acres, is served by a CSS. The remaining two-thirds is served by separate sanitary sewers and a separate storm water system (SSWS). The combined sewer service area is located primarily in the older central part of the District, and it was primarily constructed by the federal government.

Wastewater from the District and surrounding suburban areas is treated at WASA's Advanced Wastewater Treatment Plant at Blue Plains, a 370 mgd regional facility. Most of the flow that is conveyed to Blue Plains from suburban jurisdictions passes through the CSS. During wet weather events, the combined sewer portion of the system produces

CSOs that discharge into receiving waters. There are a total of 60 CSO outfalls listed in WASA's NPDES permit that discharge to Rock Creek, the Anacostia River, the Potomac River and tributary waters. The WASA NPDES permit is administered by EPA Region 3.

Status of Implementation

WASA and its predecessor organizations have been addressing CSO issues for several decades and have spent over $35 million for CSO abatement. Phase I CSO controls were completed in 1991 and featured: the Northeast Boundary Swirl Facility, inflatable dams for in-system storage, expanded pumping capacity, and expanded wet weather treatment capacity at Blue Plains.

Nine Minimum Controls

WASA has an NMC program in place to address CSOs. WASA first provided documentation on its NMC program in December 1996 (DHA, 1996). In July 1999 WASA prepared a report which updated the earlier NMC documentation (EPMC III, 1999). The summary report provided an update on various activities undertaken by WASA as part of the NMC program and included recommendations for enhancement of several activities associated with this program. An NMC Action Plan prepared in February 2000 details a schedule for implementing recommended enhancements. Examples of measures that have been implemented include:

- Regular inspections of critical facilities such as outfalls, regulators, pump stations and tide gates.
- Maximization of storage in the collection system through the use of inflatable dams.
- Inspections and maintenance of regulators and outfalls to prevent and correct dry weather overflows.
- Operation of the Northeast Boundary Swirl Facility to control CSOs and floatables.
- Operation of skimmer boats on the Anacostia and screens at certain pump stations to control floatables.
- Installation and demonstration evaluation of an end-of-pipe netting system for floatables control at CSO outfall 018.
- Placement of signs at outfalls for public notification.
- Development of a CSO web page on the WASA website.
- Major maintenance projects such as the cleaning of the Eastside Interceptor and the sonar inspection of the Anacostia siphons.

Long Term Control Plan

WASA initiated development of an LTCP in 1998. Extensive monitoring and modeling was undertaken to characterize the system during LTCP development. Flow and water quality monitoring in both the CSS and SSWS were employed to determine the hydraulic response of the system to rainfall. Receiving water monitoring was used to assess in-stream conditions, impacts, and upstream sources. The evaluation of CSO control alternatives involved development and application of CSS and SSWS models and receiving water models for Rock Creek, the Anacostia River and the Potomac River.

WASA submitted a draft LTCP to EPA Region 3 and the District of Columbia Department of Health in June 2001 (EPMC III, 2001). The recommended CSO control program is based upon the demonstration approach. The major elements of the draft LTCP and associated costs are summarized by receiving water in the following table. It is anticipated that WASA's final recommended LTCP will be submitted to the regulatory agencies for approval at the end of 2001.

Recommended LTCP Component	Capital Cost (in millions)	Annual O&M Cost (in millions)
System-wide low-impact development retrofit	$3	$0.2
Anacostia River System Improvements—pump station rehabilitation, additional tunnel storage, and new interceptor	$816	$9.1
Rock Creek System Improvements—partial separation, additional tunnel storage, and monitoring	$39	$0.5
Potomac River System Improvements—additional tunnel storage, pump station rehabilitation and dewatering	$170	$2.7
Blue Plains WWTP excess flow treatment improvements	$22	$0.4
Total	**$1,050**	**$12.9**

As shown below, the recommended LTCP is expected to reduce the volume and frequency of CSOs.

LTCP Alternative	Anacostia River	Potomac River	Rock Creek	System Total
CSO Overflow Volume (MG/year)				
No Controls	2,142	1,063	49	3,254
Phase I Controls (1991)	1,485	953	52	2,490
Recommended LTCP	96	157	11	264
Number of Overflows Per Year				
No Controls	75	74	30	—
With Phase 1 Controls (1991)	75	74	30	—
Recommended LTCP	4	12	4	—

Cost and Financing

Implementation of the recommended CSO control program is estimated to cost more than $1 billion (2001 dollars). WASA conducted a financial capability assessment and affordability analysis to evaluate the impact of the recommended program on ratepayers. The analysis considered existing rates, the rate increase associated with WASA's current non-CSO capital improvements, and the rate increase associated with the addition of the recommended CSO control program.

Using EPA guidance, wastewater treatment costs, including the recommended CSO control program, are projected to impose a medium burden based on median household income. For lower income households, current wastewater treatment costs are projected to impose a medium burden without any additional CSO controls. Addition of the recommended CSO control program greatly increases the burden level. At this time, WASA cannot predict whether financial assistance in the form of grants or other mechanisms will be available. Without such assistance, the cost of implementing CSO controls will place a major burden on rate payers, particularly those least able to afford it.

A 20-year implementation schedule for the recommended control plan was developed based on the financial capability assessment and practical aspects associated with long linear construction operations. WASA identified several early action items where implementation can proceed without waiting for approval of the complete LTCP. Early action items include low impact development retrofits, rehabilitation and improvements at pumping stations, completion of sewer separation in Luzon Valley, and monitoring and regulator improvements along Rock Creek.

Water Quality Issues

Water quality assessment concentrated on bacteria and dissolved oxygen. The CSO control program is expected to significantly reduce bacteria concentrations in all receiving waters, and improve dissolved oxygen levels in the Anacostia River. However, current water quality standards will not be attained in Rock Creek and in the Anacostia River unless upstream point and nonpoint sources are controlled in conjunction with CSO control. The draft LTCP includes a suggestion to revise provisions in the current District of Columbia water quality standards to reflect the wet weather nature of CSOs. The LTCP meets the allocation requirements of the Anacostia TMDL for biochemical oxygen demand as published by the DC Department of Health (DC Department of Health, 2001).

References

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Community Case Study — Wheeling, WV—Region 3

Number of CSO Outfalls

259 (originally)
211 (currently permitted)
168 (reported by City)

Combined Sewer Service Area

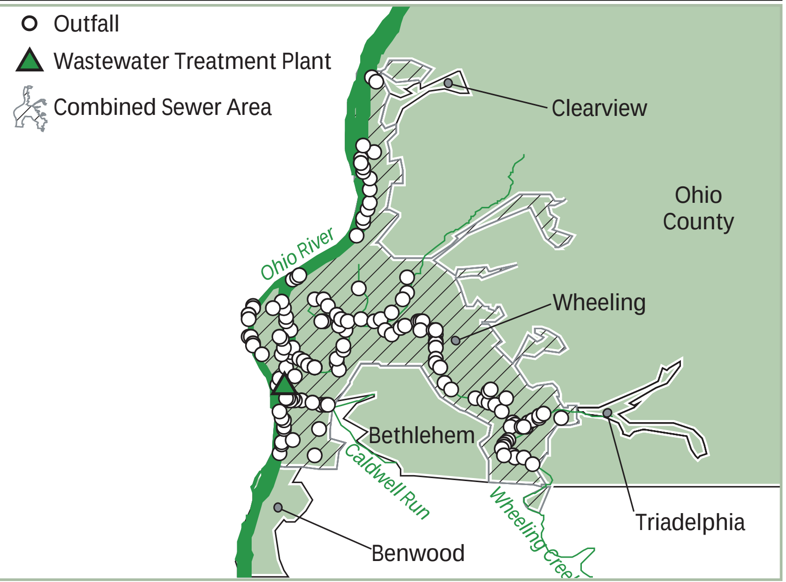
11 square miles

Wastewater Treatment Capacity

25 mgd (primary)
10 mgd (secondary)

Receiving Water(s)

Ohio River, Wheeling Creek, and Caldwell Run



Controls

- Proposed CSO control efforts focus largely on sewer separation projects at critical locations.
- The City of Wheeling has installed wire mesh traps to capture solid and floatable debris at key CSO outfalls.

Photo: Suspension bridge over Ohio River.
Courtesy of James Janos

Program Highlights

- 91 of 259 outfalls have been eliminated.
- The estimated capture of wet weather flows for treatment has increased from 25 percent to 40 percent.
- A declining population and a declining industrial and residential revenue base has led to reduced revenue for operation of sewer and wastewater facilities.
- Financial limitations of the city restrict expenditures to $1 million per year for sewer separation, but nearly $30 million is needed for priority CSO control projects.

Background on Wheeling CSOs

The City of Wheeling is located in the northern panhandle of West Virginia. The Wheeling Water Pollution Control Division (WPCD) operates a CSS that covers 7,040 acres, and a POTW with a secondary treatment capacity of 10 mgd. There are 168 CSOs in Wheeling.

The WPCD has made progress in implementing CSO controls in the face of several challenges. One challenge is steep topography. The City is surrounded to the north, east, and south by steep terrain, and it is bounded to the west by the Ohio River. The steep terrain on three sides results in rapid runoff to the CSS. As little as 0.1 inches of rain will cause flows received at the POTW to increase by three to four times their average daily flow, and CSOs begin to occur. Another challenge is that various components of the city's CSS date back to the mid-1800s, leading to substantial inflow and infiltration. Wheeling is also facing a declining population and a depressed financial condition. Ultimate compliance with water quality standards may be nearly impossible for the community unless the full benefit of the flexibility provided in the CSO Control Policy is utilized.

Status of Implementation

The WPCD has completed several CSO discharge characterization studies, has implemented the NMC, and has submitted an LTCP to the West Virginia Department of Environmental Protection (DEP) for approval.

System Characterization

Wheeling developed a *Conceptual Plan for the Analysis and Minimization of Combined Sewer Overflow Discharges* in1993. The plan outlined CSS deficiencies and prioritized subsequent CSO control activities. The plan was based on collection system analysis using SWMM and STORM models. At the time of this report, the annual percent capture of total flow entering the CSS was estimated to be 25 percent, with virtually 100 percent capture during dry weather flow conditions. In addition to the conceptual plan, Wheeling has also completed several studies in effort to characterize its CSO discharges, including:

- Analysis of water quality upstream and downstream of CSO discharges.
- Monitoring of rates and durations of representative discharges during rainfall conditions.
- Analysis of the quality of representative discharges.

Nine Minimum Controls

Wheeling developed its implementation plan for NMC in August 1996 (Smith Environmental Technologies Corporation, 1996). This plan was approved by the DEP and the Ohio River Valley Water Sanitation Commission (ORSANCO) in December 1996. The City has successfully demonstrated implementation of each of the NMC. Examples of activities conducted to fulfill the NMC requirements include:

- Daily inspection and maintenance of the collection system.
- Modification of CSO structures and sewer cleaning to maximize in-system storage.
- Installation of wire mesh traps for solids and floatables control.
- Maximization of flow to the WWTP (assisted by use of a CSO-related bypass).
- Flow monitoring and sampling.
- Development and distribution of educational and public notice materials.

Dry weather overflows continue to occur. These overflows are attributed to temporary blockages in the collection system, and to occasional surface water tie-ins that drain into overflow pipes. During dry weather conditions, the drainage from these tie-ins does not contact sanitary sewage flowing in the collection system. All observed dry weather overflows are immediately inspected when identified or reported, and blockages are removed.

Long-Term Control Plan

Wheeling submitted its LTCP on April 28, 2000 in accordance with their compliance schedule. The LTCP is under review by the DEP.

The proposed LTCP follows the demonstration approach. This is considered the necessary approach since the City cannot meet the 85 percent capture requirement of the presumption approach. Wheeling's draft March 2001 permit requires that, at a minimum, the LTCP must consist of continued maintenance and implementation of the NMC, provided there are no adverse water quality impacts. As part of its LTCP, Wheeling commits to the continued maintenance and implementation of the NMC.

The city submitted data (collected as part of the NMC requirements) to demonstrate no adverse impacts to receiving water quality due to CSO discharges. This data is presented in the 1998 report entitled *Evaluation of Small System CSO Discharges on Water Quality* (City of Wheeling WPCD and BCM Engineers, 1998). It includes more than four years of quarterly monitoring data collected during wet and dry weather periods at several points along the Ohio River and its tributaries, including locations upstream and downstream of CSO outfalls. Parameters sampled include: pH, hardness, ammonia nitrogen, total suspended solids, five-day biochemical oxygen demand, dissolved oxygen, oil and grease, fecal coliform, total coliform, lead, zinc, cadmium, and copper.

The city is also undertaking small sewer separation projects at critical locations, outside the scope of the proposed LTCP.

Costs and Financing

An April 2001 CSO Needs Survey for the City of Wheeling identified the most immediate capital needs for the Wheeling wastewater collection and treatment systems (GGJ Consulting Engineers, Inc., 2001). It was estimated that $29.5 million was needed to complete priority projects directly related to CSO control, including sewer separation projects at critical locations. An earlier 1989 engineering study estimated that complete CSO control could cost up to $350 million (in 1989 dollars).

Wheeling lacks the funds necessary to complete priority projects. The WPCD's annual budget of approximately $4 million is expended on existing O&M expenses and debt service. The WPCD and the City of Wheeling Economic and Community Development Department jointly expend approximately $1 million per year on priority sewer separation projects within the City. These separation projects have been on-going for more than 10 years.

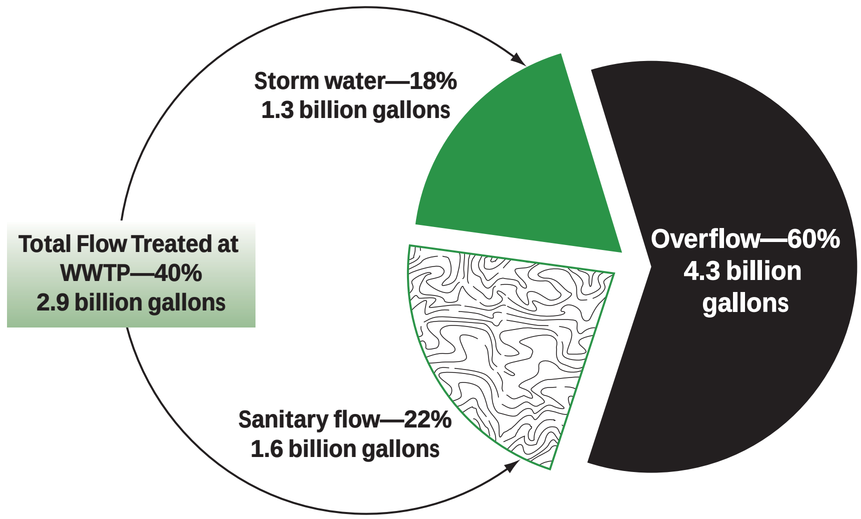
The industrial and residential revenue base is decreasing. The city's population declined by 70 between 1930 and1990. Between fiscal years 1999-2000 and 2000-2001, WPCD revenues decreased by more than five percent. The remaining population has limited resources to compensate for the losses. Approximately 17 percent of the city's population lives below the poverty line, and more than 25 percent are on a low or fixed income. Sewer rate increases have been pursued by the WPCD, but no increases have been enacted since 1995. Wheeling has made several requests for state and federal grant monies in recent years for their priority projects, but no grants have been provided to date. Additional revenue bonds and SRF loans are being considered to assist in raising funds.

Enforcement Issues

High river levels occur in the Ohio River during the winter and spring, due to runoff and operation of locks and dams by the Army Corps of Engineers. Backflow preventors on approximately 80 CSO outfalls along the Ohio River are not designed for high flow conditions. Consequently, a substantial amount of river water enters the CSS through approximately 80 CSO outfalls and is conveyed to the WWTP for treatment. This inflow of river water disrupts system operations related to biological processes. The result is WWTP permit effluent violations for biochemical oxygen demand, total suspended solids, and mass limits, even at lower flows. Plant operators do what is possible with treatment chemicals and system adjustments, but they are unable to fully address the problem. It will cost the City approximately $1 million for improvements to prevent the river inflow.

Results

Implementation of the NMC, sewer separation in priority areas, and other controls have increased the flow captured for treatment from 25 percent to 40 percent of the 7.2 billion gallons entering the CSS annually, as shown in the figure below.



The City has reduced the number of CSO outfalls from 259 to 168. This reduction includes 64 CSO outfalls that have been structurally modified to become inactive (i.e., plugged), and 27 CSO outfalls that have been eliminated through localized sewer separation.

References

City of Wheeling WPCD and BCM Engineers, 1998. *Water Pollution Control Division Evaluation of Small System CSO Discharges on Water Quality*. Report prepared for submittal to the West Virginia DEP. Wheeling, WV.

GGJ Consulting Engineers, Inc., 2001. *Capital Needs Improvement Project Review*. Report prepared for the City of Wheeling. Wheeling, WV.

King Campbell, Superintendent, City of Wheeling Water Pollution Control Division. Personal communication with Limno-Tech, Inc. staff on details of the combined sewer overflow plan and program. Summer 2001.

Appendix D

List of Current CSO Permits

List of Current CSO Permits, Sorted by Region and State

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
1	Connecticut	CT0100366	New Haven East Shore WPCF	19
1	Connecticut	CT0100412	Norwich WPCF	15
1	Connecticut	CT0100056	Bridgeport-West WPCF	32
1	Connecticut	CT0100251	Hartford MDC WPCF	44
1	Connecticut	CT0101010	Bridgeport-East WPCF	12
1	Maine	ME0100561	Presque Isle Sewer District	1
1	Maine	ME0102423	Randolph WWTF	1
1	Maine	ME0102369	Fort Kent Utility District	4
1	Maine	ME0102075	Portland Water District	35
1	Maine	ME0101796	Lincoln Sanitary District	1
1	Maine	ME0101702	City of Gardiner	2
1	Maine	ME0101681	Madawaska PCF	2
1	Maine	ME0101532	Belfast WWTF	2
1	Maine	ME0101478	Lewiston-Auburn WPCA	1
1	Maine	ME0101214	Bar Harbor WWTF	4
1	Maine	ME0100072	City of Brewer	7
1	Maine	ME0100439	Milo Water District	3
1	Maine	ME0100391	Mechanic Falls Sanitary District	2
1	Maine	ME0100323	Machias WWTP	2
1	Maine	ME0100307	Lisbon WWTF	2
1	Maine	ME0100285	Town of Kittery	3
1	Maine	ME0100153	Corrina Sewer District	3
1	Maine	ME0100111	Bucksport WWTF	2
1	Maine	ME0100501	Town of Dover-Foxcroft Wastewater Department	4
1	Maine	ME0100048	Biddeford Wastewater Department	13
1	Maine	ME0100021	Bath WWTP	6
1	Maine	ME0100013	Augusta Sanitary District	23
1	Maine	ME0100129	Calais	1
1	Maine	ME0100617	Sanford Sewerage District	2
1	Maine	ME0100951	Paris WWTP	1
1	Maine	ME0100854	Kennebec Sanitary District	3
1	Maine	ME0100781	Bangor WWTP	12
1	Maine	ME0100765	Yarmouth	
1	Maine	ME0100749	Winterport Sewerage District	1
1	Maine	ME0100471	Old Town PCF	3
1	Maine	ME0100625	Skowhegan WPCP	9
1	Maine	ME0100498	Orono Water Pollution Control Facility	1
1	Maine	ME0100595	Rockland WWTF	3
1	Maine	ME0100633	City of South Portland	10
1	Maine	ME0101117	Saco WWTP	6

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
1	Maine	ME0101265	Cape Elizabeth-Portland Water District	1
1	Maine	ME0100005	Auburn Sewerage District	11
1	Maine	ME0100196	Town of East Millinocket	1
1	Maine	ME0100722	Winslow Sanitary District	2
1	Maine	ME0100846	Westbrook/Portland Water District	5
1	Maine	ME0100897	Hamden	1
1	Maine	ME0101010	Hallowell Water District	1
1	Maine	ME0101494	Fairfield	2
1	Maine	ME0100994	Lewiston	30
1	Massachusetts	MA0100137	Montague WPCF	3
1	Massachusetts	MA0100455	South Hadley WWT	3
1	Massachusetts	MA0102351	MWRA, Deer Island WWTP	12
1	Massachusetts	MA0101630	Holyoke WPCF	15
1	Massachusetts	MA0101621	Haverhill WWTF	23
1	Massachusetts	MA0101508	Chicopee WPCF	40
1	Massachusetts	MA0101389	West Springfield	1
1	Massachusetts	MA0100382	Fall River WWTP	19
1	Massachusetts	MA0100986	Fitchburg WWTF	27
1	Massachusetts	MA0100447	Greater Lawrence Sanitary District	4
1	Massachusetts	MA0100897	Taunton WWTP	1
1	Massachusetts	MA0100781	New Bedford WWTF	35
1	Massachusetts	MA0100633	Lowell Regional WWU	9
1	Massachusetts	MA0100625	Gloucester WPCF	5
1	Massachusetts	MA0100552	Lynn WWTF	4
1	Massachusetts	MA0101168	Palmer WPCF	21
1	Massachusetts	MA0101338	Town of Ludlow CSOs	1
1	Massachusetts	MA0101192	Boston Water and Sewer Commission	37
1	Massachusetts	MA0101877	Chelsea	4
1	Massachusetts	MA0101974	City of Cambridge	11
1	Massachusetts	MA0101982	Somerville DPW	3
1	Massachusetts	MA0102997	Worcester Combined Overflow Facility	1
1	Massachusetts	MA0103331	Springfield CSOs	32
1	New Hampshire	NH0100447	City of Manchester WWTF	26
1	New Hampshire	NH0100366	City of Lebanon WWTF	7
1	New Hampshire	NH0100234	City of Portsmouth	2
1	New Hampshire	NH0100170	Nashua WWTF	8
1	New Hampshire	NH0100013	Berlin PCF	1
1	Rhode Island	RI0100293	Newport City Hall	3

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
1	Rhode Island	RI0100072	Narragansett Bay-Pawtucket	28
1	Rhode Island	RI0100315	Narragansett Bay	56
1	Vermont	VT0100196	Montpelier WWTF	16
1	Vermont	VT0100871	Rutland WWTP	3
1	Vermont	VT0100579	St. Johnsbury WWTF	20
1	Vermont	VT0100404	Vergennes WWTF	0
1	Vermont	VT0100285	Randolph WWTF	3
1	Vermont	VT0100153	Burlington Main WWTF	1
1	Vermont	VT0100374	Springfield WWTF	21
2	New Jersey	NJ0020028	Bergen County WWTP	0
2	New Jersey	NJ0020591	Edgewater MUA	7
2	New Jersey	NJ0020141	Middlesex County Utility Authority	0
2	New Jersey	NJ0108707	Passaic Valley	0
2	New Jersey	NJ0034339	North Bergen MUA	0
2	New Jersey	NJ0029084	Woodcliff	1
2	New Jersey	NJ0026182	Camden County MUA	0
2	New Jersey	NJ0026085	North Hudson-Adam Street	11
2	New Jersey	NJ0025321	West New York MUA	2
2	New Jersey	NJ0024741	Joint Meeting Sewage Treatment	0
2	New Jersey	NJ0024643	Rahway Valley Sewerage Authority	0
2	New Jersey	NJ0021016	Passaic Valley Sewerage Commission	0
2	New Jersey	NJ0020923	Trenton Sewer Utility	1
2	New Jersey	NJ0108898	North Bergen	9
2	New Jersey	NJ0034517	Bluff Road	2
2	New Jersey	NJ0109240	City of Bayonne CSOs	32
2	New Jersey	NJ0111244	Town of Kearny	10
2	New Jersey	NJ0117846	East Newark	1
2	New Jersey	NJ0108880	City of Patterson	31
2	New Jersey	NJ0109118	Ridgefield Park Village	6
2	New Jersey	NJ0108758	Newark	30
2	New Jersey	NJ0020141a	Perth Amboy	18
2	New Jersey	NJ0108715	Guttenberg Town	1
2	New Jersey	NJ0108731	City of Rahway	3
2	New Jersey	NJ0108766	City of Hackensack	2
2	New Jersey	NJ0108782	City of Elizabeth	34
2	New Jersey	NJ0108791	Camden County MUA	1
2	New Jersey	NJ0108812	City of Camden	31
2	New Jersey	NJ0108847	Gloucester City	7
2	New Jersey	NJ0108871	Town of Harrison	7
2	New Jersey	NJ0108723	Jersey City MUA	27

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
2	New York	NY0026131	Ward Island WPCP	77
2	New York	NY0026221	NYCDEP Rockaway WWTP	27
2	New York	NY0026212	NYCDEP 26th Ward	3
2	New York	NY0026204	Newtown Creek WPCP	83
2	New York	NY0026191	NYCDEP-Hunt's Point WPCP	28
2	New York	NY0026182	NYCDEP Coney Island WPCP	4
2	New York	NY0026174	NYCDEP Oakwood Beach WPCP	57
2	New York	NY0026247	North River WPCF	50
2	New York	NY0026158	NYCDEP Bowery Bay WPCP	52
2	New York	NY0026255	Poughkeepsie WPCP	6
2	New York	NY0026115	NYCDEP Jamaica WPCP	7
2	New York	NY0026107	Port Richmond WPCF	36
2	New York	NY0026018	Plattsburgh WPCP	14
2	New York	NY0025984	Watertown WPCP	17
2	New York	NY0025780	Oneida County WPCP	1
2	New York	NY0025151	Carthage West WPCF	0
2	New York	NY0026166	NYCDEP Owls Head WPCP	16
2	New York	NY0027081	Syracuse Metro WWTP	62
2	New York	NY0029173	Waterford WWTP	4
2	New York	NY0029114	City of Oswego, East Side STP	6
2	New York	NY0029050	Glens Falls WWTP	1
2	New York	NY0028339	Frank E. VanLare STP	6
2	New York	NY0028240	Saratoga County Sewer District 1	0
2	New York	NY0027961	Dunkirk WWTP	1
2	New York	NY0026239	Tallman Island WPCP	20
2	New York	NY0027545	Clayton Village WTF	2
2	New York	NY0027073	Red Hook WPCP	34
2	New York	NY0027057	Lockport WWTP	29
2	New York	NY0026875	Albany North WWTP	0
2	New York	NY0026867	Albany South WWTP	0
2	New York	NY0026689	Yonkers Joint WWTP	26
2	New York	NY0026336	Niagara Falls WWTP	9
2	New York	NY0026310	Newburgh WPCP	12
2	New York	NY0026280	North Tonawanda WWTP	13
2	New York	NY0027766	Lewiston Master S.D.	1
2	New York	NY0020494	Boonville WWTP	1
2	New York	NY0023256	Village of Holley STP	1
2	New York	NY0022403	Little Falls WWTP	3
2	New York	NY0022136	Erie County S.D. #6	1
2	New York	NY0022039	Hudson STP	10

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
2	New York	NY0021903	Auburn STP	16
2	New York	NY0021873	Medina WWTP	13
2	New York	NY0020818	Potsdam WPCP	1
2	New York	NY0020516	Schenectady WPCP	2
2	New York	NY0020389	Catskill WWTP	5
2	New York	NY0020290	Amsterdam WWTP	3
2	New York	NY0020117	Gouverneur STP	1
2	New York	NY0024414	Binghamton-Johnson City Joint WWTF	0
2	New York	NY0020621	Wellsville WWTP	3
2	New York	NY0029262	Owego STP	8
2	New York	NY0029106	Oswego-West Side STP	1
2	New York	NY0028410	Bird Island WWTF	65
2	New York	NY0183695	Washington County S.D. 2	11
2	New York	NY0087971	Rensselaer County	0
2	New York	NY0036706	Ticonderoga S.D. #5 WPCP	2
2	New York	NY0033545	Village of Coxsackie STP	3
2	New York	NY0031208	Dock Street STP	0
2	New York	NY0031194	Massena WWTP	10
2	New York	NY0029939	Tupper Lake WPCP	3
2	New York	NY0029831	Ogdensburg WWTP	17
2	New York	NY0029807	Canastota WPCF	7
2	New York	NY0029351	Kingston WWTF	7
2	New York	NY0035742	Chemung County-Elmira S.D. STP	11
2	New York	NY0029297	Owasco S.D. #1 Overflows	3
2	New York	NY0024406	Binghamton CSO	7
2	New York	NY0024481	Lewiston ORF	1
2	New York	NY0026026	Rensselaer CSO	8
2	New York	NY0030899	Watervliet CSO	5
2	New York	NY0031046	Cohoes CSO	16
2	New York	NY0031429	Utica CSO	82
2	New York	NY0033031	Green Island CSO	3
2	New York	NY0099309	Troy CSO	49
2	New York	NY0248941	City of Mechanicville CSO	3
2	New York	NY0025747	Albany CSO	12
3	Delaware	DE0020320	Wilmington	38
3	Delaware	DE0020265	Seaford WWTF	1
3	District of Columbia	DC0021199	District of Columbia WWTP	60
3	Maryland	MD0021601	Patapsco WWTP	2
3	Maryland	MD0021636	Cambridge WWTP	14
3	Maryland	MD0021598	Cumberland WWTP	16

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
3	Maryland	MD0021571	Salisbury WWTP	2
3	Maryland	MD0067423	Frostburg CSOs	15
3	Maryland	MD0067407	Allegany County CSOs	3
3	Maryland	MD0067547	LaVale CSOs	3
3	Maryland	MD0067384	Westernport Town	3
3	Pennsylvania	PA0028223	Corry City Municipal Authority	3
3	Pennsylvania	PA0027014	Altoona City Authority-East	1
3	Pennsylvania	PA0027120	Warren City	4
3	Pennsylvania	PA0027197	Harrisburg Authority	61
3	Pennsylvania	PA0027227	Farrell City	6
3	Pennsylvania	PA0026689	Philadelphia Water Department - Northeast	59
3	Pennsylvania	PA0028207	Reynoldsville Sewer Authority	6
3	Pennsylvania	PA0026671	Philadelphia Water Department - Southwest	83
3	Pennsylvania	PA0036650	Titusville City	5
3	Pennsylvania	PA0037711	Everett Borough Municipal Authority	5
3	Pennsylvania	PA0038920	Burnham Borough	7
3	Pennsylvania	PAG066134	Township of Lett	
3	Pennsylvania	PA0027421	Norristown MWA	2
3	Pennsylvania	PA0021571	Marysville Municipal Authority	3
3	Pennsylvania	PA0020346	Punxsutawney Sewer Authority STP	4
3	Pennsylvania	PA0020397	Bridgeport Borough	6
3	Pennsylvania	PA0021237	Newport Borough Municipal Authority	3
3	Pennsylvania	PA0026832	Ellwood City Borough	1
3	Pennsylvania	PA0021539	Williamsburg Borough	1
3	Pennsylvania	PA0026743	Lancaster City	4
3	Pennsylvania	PA0022209	Bedford Borough Municipal Authority	2
3	Pennsylvania	PA0023175	Kane Borough	1
3	Pennsylvania	PA0026174	Franklin City General Authority	4
3	Pennsylvania	PA0026182	Lansdale Borough	2
3	Pennsylvania	PA0026191	Huntington Borough	6
3	Pennsylvania	PA0026662	Philadelphia Water Department - Southeast	35
3	Pennsylvania	PA0021521	Smethport Borough	1
3	Pennsylvania	PA0070386	Shenandoah STP	13
3	Pennsylvania	PA0037818	Saltsburg Borough STP	6
3	Pennsylvania	PA0092355	North Belle Vernon WPCP	16
3	Pennsylvania	PA0070041	Mahanoy City (MCSA) STP	1
3	Pennsylvania	PA0046159	MSA of Houtzdale Borough	1
3	Pennsylvania	PA0043885	Greater Pottsville Area Sewer Authority	54
3	Pennsylvania	PA0043877	Greater Pottsville Area Sewer Authority (West End)	4
3	Pennsylvania	PA0043273	Hollidaysburg Regional WWTP	4

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
3	Pennsylvania	PA0042234	Kittanning Borough STP	9
3	Pennsylvania	PA0039489	Garrett Boro SIP	2
3	Pennsylvania	PA0026107	Wyoming Valley Sewer Authority	54
3	Pennsylvania	PA0096229	Marianna-West Bethlehem STP	1
3	Pennsylvania	PA0037044	Ford City WTP	3
3	Pennsylvania	PA0026492	Scranton WWTF	69
3	Pennsylvania	PA0027006	Tamaqua Borough Sewer Authority	16
3	Pennsylvania	PA0026981	City of Duquesne STP	4
3	Pennsylvania	PA0026921	Hazelton WTP	14
3	Pennsylvania	PA0026913	McKeesart WPCP	28
3	Pennsylvania	PA0026905	Connellsville STP	16
3	Pennsylvania	PA0026891	Charleroi STP	12
3	Pennsylvania	PA0038164	Borough of Confluence	2
3	Pennsylvania	PA0027057	Williamsport Sanitary Authority Central	3
3	Pennsylvania	PA0026476	Coaldale Landsford-Summitt Hill TP	6
3	Pennsylvania	PA0026361	Lower Lackawanna Valley Sanitary Authority	24
3	Pennsylvania	PA0026352	Coraopolis WPCF	6
3	Pennsylvania	PA0026310	Clearfield Municipal Authority	9
3	Pennsylvania	PA0026301	Erie City STP	20
3	Pennsylvania	PA0026204	Oil City STP	16
3	Pennsylvania	PA0026158	Monongahela Valley WWTP	21
3	Pennsylvania	PA0026140	Rochester Area Joint Sewer Authority WTP	3
3	Pennsylvania	PA0026581	Scottsdale STP	8
3	Pennsylvania	PA0027430	Jeannette WWTP	5
3	Pennsylvania	PA0036820	Galeton Borough Authority	4
3	Pennsylvania	PA0028673	Borough of Gallitzin WWTP	6
3	Pennsylvania	PA0028631	Mid-Cameron Authority	1
3	Pennsylvania	PA0028436	Elizabeth Borough STP	6
3	Pennsylvania	PA0028401	Dravosburg Borough STP	1
3	Pennsylvania	PA0027693	Minersville Sewer Authority	10
3	Pennsylvania	PA0027651	West Newton Borough STP	13
3	Pennsylvania	PA0027626	Kiski Valley STP	32
3	Pennsylvania	PA0027022	Altoona West STP	1
3	Pennsylvania	PA0027456	Greater Greensboro STP	39
3	Pennsylvania	PA0027049	Williamsport Sanitary Authority West Plant	1
3	Pennsylvania	PA0027391	Upper Allegheny Joint Sanitary Authority STP	19
3	Pennsylvania	PA0027324	Shamokin-Coal Township Joint Sewer Authority	5
3	Pennsylvania	PA0027111	New Kensington STP	5
3	Pennsylvania	PA0027103	DELCORA Chester STP	26
3	Pennsylvania	PA0027090	Lackawanna River Basin Sewer Authority-Throop	25

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
3	Pennsylvania	PA0027081	Lackawanna River Basin Sewer Authority-Clinton	9
3	Pennsylvania	PA0027065	Lackawanna River Basin Sewer Authority-Archbald	16
3	Pennsylvania	PA0027570	Brush Creek STP	3
3	Pennsylvania	PA0026557	Municipal Authority of the City of Sunbury	6
3	Pennsylvania	PA0026824	Clairton STP	5
3	Pennsylvania	PA0025755	Borough of Freeport STP	6
3	Pennsylvania	PA0021610	Blairsville Borough STP	16
3	Pennsylvania	PA0024686	Mid Mon Valley WPCP	8
3	Pennsylvania	PA0024716	Freeland WWTP	1
3	Pennsylvania	PA0024864	Ligonier Boro STP	2
3	Pennsylvania	PA0021407	Point Mariah WWTP	6
3	Pennsylvania	PA0024511	Redbank Valley Municipal Authority	2
3	Pennsylvania	PA0025224	St. Clair S.A. WWTP	7
3	Pennsylvania	PA0024490	Rockwood Boro STP	5
3	Pennsylvania	PA0021113	Glassport STP	5
3	Pennsylvania	PA0025810	Shade-Central City STP	3
3	Pennsylvania	PA0020940	Tunkhannock Borough Municipal Authority	2
3	Pennsylvania	PA0020702	Fayette City WWTP	2
3	Pennsylvania	PA0023469	Honesdale STP	20
3	Pennsylvania	PA0025950	City of Monongahela	1
3	Pennsylvania	PA0021148	Mt. Pleasant STP	6
3	Pennsylvania	PA0023736	Tri-Borough Municipal Authority WWTP	2
3	Pennsylvania	PA0023248	Berwick Area Joint Sewer Authority	4
3	Pennsylvania	PA0022331	West Elizabeth WWTP	1
3	Pennsylvania	PA0022306	Brownsville Municipal Authority-Shady Avenue STP	4
3	Pennsylvania	PA0022292	Ebensburg WWTP	2
3	Pennsylvania	PA0022241	California Borough STP	3
3	Pennsylvania	PA0021814	Mansfield WWTP	4
3	Pennsylvania	PA0024589	Leetsdale STP	6
3	Pennsylvania	PA0023701	Midland Borough Municipal Authority STP	1
3	Pennsylvania	PA0020681	Sewickley WWTP	4
3	Pennsylvania	PA0024163	Cambria Township Sewer Authority (Revloc STP)	1
3	Pennsylvania	PA0024341	Canton Borough Authority	1
3	Pennsylvania	PA0024406	Mt. Carmel Municipal Authority	19
3	Pennsylvania	PA0024449	Youngwood Borough STP	2
3	Pennsylvania	PA0024481	Meyersdale STP	5
3	Pennsylvania	PA0021687	Wellsboro Municipal Authority	2
3	Pennsylvania	PA0023558	Ashland Borough	9
3	Pennsylvania	PA0025984	Allegheny County Sanitary Authority	21
3	Pennsylvania	PA0026069	Latrobe Borough	18

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
3	Pennsylvania	PA0026042	Bethlehem WWTP	3
3	Pennsylvania	PA0020613	Waynesbug STP	2
3	Pennsylvania	PA0020125	Boro of Monaca STP	6
3	Pennsylvania	PAG066102	Braddock Borough	8
3	Pennsylvania	PAG066109	McDonald Sewage Authority	20
3	Pennsylvania	PA0217611	City of Pittsburgh	217
3	Pennsylvania	PAG062201	Easton City	2
3	Pennsylvania	PAG062202	Lackawanna River Basin Authority-Moosic	4
3	Pennsylvania	PAG064801	Shamokin City	33
3	Pennsylvania	PAG066101	Pitcairn Borough	1
3	Pennsylvania	PAG066103	Borough of Homestead	1
3	Pennsylvania	PAG066104	Bureau of Wilmerding	9
3	Pennsylvania	PAG066105	Borough of Rankin	2
3	Pennsylvania	PAG066106	Girty's Run JSA, Millvale	9
3	Pennsylvania	PAG066107	Township of Stowe	7
3	Pennsylvania	PAG064802	Coal Township	33
3	Pennsylvania	PAG066110	Borough of Crafton	4
3	Pennsylvania	PAG066108	Larimer Avenue CSO	2
3	Pennsylvania	PAG066129	Mayview State Hospital	2
3	Pennsylvania	PAG066130	Export Borough	5
3	Pennsylvania	PAG066131	Freedom Borough	3
3	Pennsylvania	PAG066132	East Rochester Borough	1
3	Pennsylvania	PAG066127	Munhall Boro	4
3	Pennsylvania	PAG066126	Carnegie Borough	1
3	Pennsylvania	PAG066119	Borough of Etna	8
3	Pennsylvania	PAG066111	Emsworth Borough	1
3	Pennsylvania	PAG066112	Borough of McKee Rocks	3
3	Pennsylvania	PAG066113	Borough of Aspinwall	3
3	Pennsylvania	PAG066114	Borough of North Braddock	1
3	Pennsylvania	PAG066115	Ferndale Borough	5
3	Pennsylvania	PAG066116	West View Borough	2
3	Pennsylvania	PAG066128	Borough of Swissvale	1
3	Pennsylvania	PAG066118	Borough of Turtle Creek	10
3	Pennsylvania	PAG066120	Borough of East Pittsburgh	3
3	Pennsylvania	PAG066121	City of Arnold	2
3	Pennsylvania	PAG066122	East Conemaugh Borough	2
3	Pennsylvania	PAG066123	Borough of West Homestead	2
3	Pennsylvania	PAG066124	Dale Borough	7
3	Pennsylvania	PAG066125	Sharpsburg Borough	6
3	Pennsylvania	PAG066117	City of Uniontown	28

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
3	Virginia	VA0063177	Richmond WWTW	31
3	Virginia	VA0024970	Lynchburg STP	64
3	Virginia	VA0087068	Alexandria CSOs	4
3	West Virginia	WV0105279	City of Piedmont	
3	West Virginia	WV0023205	Charleston	58
3	West Virginia	WV0024473	Marlington	1
3	West Virginia	WV0024392	Keyser	1
3	West Virginia	WV0023353	Fairmont	43
3	West Virginia	WV0023302	City of Clarksburg	84
3	West Virginia	WV0023299	Nitro	7
3	West Virginia	WV0023264	City of Moundsville	5
3	West Virginia	WV0024732	City of Hinton	6
3	West Virginia	WV0023183	Beckley	2
3	West Virginia	WV0023175	St. Albans	12
3	West Virginia	WV0023167	Martinsburg	1
3	West Virginia	WV0023159	Huntington	23
3	West Virginia	WV0023124	City of Morgantown	33
3	West Virginia	WV0023094	Princeton	1
3	West Virginia	WV0022080	Town of Bethany	3
3	West Virginia	WV0022063	City of Parsons	4
3	West Virginia	WV0023230	Wheeling	211
3	West Virginia	WV0029289	City of Belington	7
3	West Virginia	WV0084042	Flatwoods-Canoe Run PSD	6
3	West Virginia	WV0054500	City of Shinnston	12
3	West Virginia	WV0035939	Boone County PSD	1
3	West Virginia	WV0033821	City of Logan	12
3	West Virginia	WV0024562	City of Wayne	3
3	West Virginia	WV0032336	Buckhannon	6
3	West Virginia	WV0024589	Welch	28
3	West Virginia	WV0028118	Dunbar	16
3	West Virginia	WV0028088	Weston	5
3	West Virginia	WV0027472	New Martinsville	4
3	West Virginia	WV0027324	Monongah	6
3	West Virginia	WV0026832	Wellsburg	10
3	West Virginia	WV0025461	City of Bridgeport	11
3	West Virginia	WV0024848	Town of Davis	3
3	West Virginia	WV0021881	Kingwood	3
3	West Virginia	WV0033804	Terra Alta	
3	West Virginia	WV0022039	Point Pleasant	2
3	West Virginia	WV0020273	City of Follansbee	5

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
3	West Virginia	WV0021865	Town of Farmington	3
3	West Virginia	WV0021857	City of Philippi	13
3	West Virginia	WV0021822	Grafton	35
3	West Virginia	WV0021792	Petersburg	2
3	West Virginia	WV0021750	Marmet	3
3	West Virginia	WV0021741	Smithers	3
3	West Virginia	WV0020681	Mullens	3
3	West Virginia	WV0020621	Montgomery	5
3	West Virginia	WV0022004	Richwood	2
3	West Virginia	WV0020150	Moorefield	3
3	West Virginia	WV0020141	McMechen	3
3	West Virginia	WV0020109	Town of West Union	7
3	West Virginia	WV0020028	City of Elkins	19
3	West Virginia	WV0020648	City of Benwood	9
3	West Virginia	WV0023221	Vienna	2
3	West Virginia	WV0024449	City of Westover	5
3	West Virginia	WV0035637	Cedar Grove	1
3	West Virginia	WV0035912	City of Kenova	2
3	West Virginia	WV0081434	City of Barrackville	9
3	West Virginia	WV0084310	Greater Paw Paw Sanitary District	10
3	West Virginia	WV0100901	Nutter Fort	2
4	Georgia	GA0036854	City of Albany CSOs	10
4	Georgia	GA0036838	Columbus CSO	2
4	Georgia	GA0036871	Atlanta-Clear Creek	1
4	Georgia	GA0037109	Atlanta-Tanyard Creek	1
4	Georgia	GA0037117	Atlanta-Proctor Creek/North	1
4	Georgia	GA0037125	Atlanta-Proctor Creek/Greenferry	1
4	Georgia	GA0037133	Atlanta-McDaniel Street	1
4	Georgia	GA0037168	Atlanta-Intrenchment and Custer Avenue	2
4	Kentucky	KY0020095	Owensboro-West	7
4	Kentucky	KY0022799	Paducah WWTP	10
4	Kentucky	KY0035467	Catlettsburg WWTP	17
4	Kentucky	KY0027413	Prestonsburg WWTP	1
4	Kentucky	KY0026115	Loyall WWTP	6
4	Kentucky	KY0026093	Harlan WWTP	1
4	Kentucky	KY0025291	Pikeville WWTP	3
4	Kentucky	KY0024058	Pinesville STP	6
4	Kentucky	KY0022861	E.C. McManis WWTP	15
4	Kentucky	KY0022411	Morris Forman WWTF	115
4	Kentucky	KY0022373	Ashland WWTP	8

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
4	Kentucky	KY0021512	Vanceburg WWTP	5
4	Kentucky	KY0021466	Northern Kentucky S.D. #1	74
4	Kentucky	KY0021440	Morganfield WWTP	2
4	Kentucky	KY0020711	Henderson WWTP	15
4	Kentucky	KY0020257	Maysville WWTP	11
4	Kentucky	KY0022926	Worthington WWTP	3
4	Tennessee	TN0024210	Chattanooga	18
4	Tennessee	TN0020656	Clarksville	2
4	Tennessee	TN0020575	Nashville	30
5	Illinois	IL0030660	City of Peru STP	23
5	Illinois	IL0029424	LaSalle WWTP	3
5	Illinois	IL0029467	Lawrenceville STP	4
5	Illinois	IL0029564	Lincoln STP	3
5	Illinois	IL0029831	Mattoon WWTP	5
5	Illinois	IL0029874	City of Metropolis STP	1
5	Illinois	IL0030015	Morton STP 2	2
5	Illinois	IL0030384	Ottawa STP	14
5	Illinois	IL0030503	Quincy STP	7
5	Illinois	IL0030783	Rock Island	5
5	Illinois	IL0031216	Spring Valley WWTP	9
5	Illinois	IL0031356	Taylorville S.D. STP	2
5	Illinois	IL0031852	Wood River STP	1
5	Illinois	IL0033472	East St. Louis CSOs	2
5	Illinois	IL0034495	Pekin STP 1	4
5	Illinois	IL0030457	Pontiac STP	5
5	Illinois	IL0068365	Marshall STP	3
5	Illinois	IL0035084	City of Casey STP	1
5	Illinois	IL0043061	Prophetstown STP	3
5	Illinois	IL0037818	Minonk STP	3
5	Illinois	IL0023272	Milford STP	4
5	Illinois	IL0023281	Gibson City STP	3
5	Illinois	IL0023825	Cairo STP	3
5	Illinois	IL0028053	MWRDGC Stickney, West-Southwest STP	19
5	Illinois	IL0028061	MWRDGC Calumet Water Reclamation Plant	15
5	Illinois	IL0028088	MWRDGC-Northside Water Reclamation Plant	9
5	Illinois	IL0028231	Cowden STP	2
5	Illinois	IL0028321	S.D. of Decatur Main STP	4
5	Illinois	IL0028622	Effingham STP	4
5	Illinois	IL0028657	Fox River WRD-South STP	16
5	Illinois	IL0023388	Havana STP	2

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
5	Illinois	IL0027464	City of Alton STP	6
5	Illinois	IL0027839	Canton-West STP	4
5	Illinois	IL0027731	Bloomington/Normal WRD/STP	11
5	Illinois	IL0024996	City of Oglesby STP	7
5	Illinois	IL0025135	Beardstown S.D.	1
5	Illinois	IL0026450	Dixon STP	9
5	Illinois	IL0027367	Addison	3
5	Illinois	IL0047741	MWRDGC James C. Kire WRP	1
5	Illinois	IL0021253	Monmouth Main WWTP	7
5	Illinois	IL0021377	Paris STP	2
5	Illinois	IL0021601	Fairbury STP	12
5	Illinois	IL0021661	Jacksonville STP	3
5	Illinois	IL0021792	Wenona WWTP	2
5	Illinois	IL0021873	City of Belleville STP #1	18
5	Illinois	IL0021890	Shelbyville STP	3
5	Illinois	IL0020818	Fox Metro Water Reclamation District	1
5	Illinois	IL0021113	City of Morris STP	6
5	Illinois	IL0021059	Marseilles STP	2
5	Illinois	IL0020184	City of Oregon STP	10
5	Illinois	IL0020621	Litchfield STP	2
5	Illinois	IL0023141	Galesburg Sanitary District	41
5	Illinois	IL0022462	Farmer City STP	3
5	Illinois	IL0022322	City of Georgetown STP	1
5	Illinois	IL0022331	Granville STP	4
5	Illinois	IL0022519	City of Joliet-Eastside STP	12
5	Illinois	IL0022543	City of Batavia WWTF	1
5	Illinois	IL0022675	Carlinville STP	2
5	Illinois	IL0022161	Watseka STP	7
5	Illinois	IL0021971	Sugar Creek STP	3
5	Illinois	IL0021989	Spring Creek STP	7
5	Illinois	IL0022004	City of Streator STP	17
5	Illinois	IL0052426	Village of Dolton CSOs	3
5	Illinois	IL0052469	Village of Melrose Park CSO	1
5	Illinois	IL0044920	Village of River Grove CSO	6
5	Illinois	IL0044890	Brookfield CSOs	7
5	Illinois	IL0052451	Lincolnwood CSOs	2
5	Illinois	IL0052434	Skokie CSOs	2
5	Illinois	IL0044881	City of Calumet City CSOs	7
5	Illinois	IL0052418	Summit CSOs	4
5	Illinois	IL0044954	Village of Lyons CSOs	3

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
5	Illinois	IL0044911	Village of Schiller Park CSO	1
5	Illinois	IL0045012	Chicago CSOs	231
5	Illinois	IL0052442	City of Blue Island CSOs	4
5	Illinois	IL0045080	City of Harvey CSOs	7
5	Illinois	IL0037800	City of Peoria CSOs	18
5	Illinois	IL0036536	City of Evanston CSOs	14
5	Illinois	IL0033618	Village of Villa Park CSOs	4
5	Illinois	IL0033588	LaGrange Park CSOs	3
5	Illinois	IL0028592	Metro East S.D. CSOs	4
5	Illinois	IL0047147	Village of Maywood CSOs	8
5	Illinois	IL0021423	Village of Hartford CSO	1
5	Illinois	IL0046795	Village of River Forest CSOs	4
5	Illinois	IL0044733	Park Ridge CSOs	4
5	Illinois	IL0029416	Lansing CSO	1
5	Illinois	IL0048518	Aurora CSOs	15
5	Illinois	IL0045039	Village of Western Springs CSOs	3
5	Illinois	IL0045047	Village of Arlington Heights CSO	1
5	Illinois	IL0045055	Village of South Holland CSOs	4
5	Illinois	IL0045063	Village of Calumet Park CSO	1
5	Illinois	IL0045071	Village of North Riverside CSOs	2
5	Illinois	IL0044725	Dixmoor CSO	1
5	Illinois	IL0037885	City of Markham CSO	1
5	Illinois	IL0043133	Posen CSO	1
5	Illinois	IL0045021	Riverside CSOs	5
5	Illinois	IL0045098	Village of Riverdale CSOs	4
5	Illinois	IL0045101	Village of Forest Park CSOs	2
5	Illinois	IL0046175	Village of Morton Grove CSOs	2
5	Illinois	IL0046418	Franklin Park CSOs	4
5	Illinois	IL0042901	Village of Burnham CSOs	3
5	Illinois	IL0039551	Village of Lemont CSOs	2
5	Illinois	IL0044717	Des Plaines CSO	1
5	Illinois	IL0066818	Hinsdale CSOs	4
5	Illinois	IL0069981	Wilmette CSO	1
5	Illinois	IL0070505	City of Elgin CSOs	12
5	Illinois	IL0072001	Bloomington CSOs	6
5	Illinois	IL0052477	Village of Niles CSOs	10
5	Indiana	IN0020044	City of Alexandria WPCP	4
5	Indiana	IN0020095	Portland Municipal STP	16
5	Indiana	IN0020001	Ridgeville WWTP	3
5	Indiana	IN0020109	Greenfield	0

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
5	Indiana	IN0020117	Montpelier WWTP	4
5	Indiana	IN0020125	Royal Center WWTP	2
5	Indiana	IN0020133	Greensburg WWTP	3
5	Indiana	IN0020168	City of Noblesville WWTP	7
5	Indiana	IN0020176	Monticello Municipal STP	5
5	Indiana	IN0020222	Attica	2
5	Indiana	IN0025585	City of Marion WWTP	8
5	Indiana	IN0025666	City of Madison WWTP	7
5	Indiana	IN0025658	Washington Municipal STP	6
5	Indiana	IN0021016	Tell City WWTP	5
5	Indiana	IN0025640	City of Mishawaka WWTP	18
5	Indiana	IN0021067	Rockport WWTP	1
5	Indiana	IN0025631	Muncie Sanitary District	25
5	Indiana	IN0025755	City of Goshen WWTP	6
5	Indiana	IN0025607	City of Terre Haute POTW	10
5	Indiana	IN0025763	City of Crownpoint WWTP	5
5	Indiana	IN0025577	LaPorte Municipal STP	1
5	Indiana	IN0025232	Town of Akron WWTP	3
5	Indiana	IN0024821	West Lafayette WWTP	5
5	Indiana	IN0024805	Warsaw WWTP	1
5	Indiana	IN0024791	Warren	4
5	Indiana	IN0024775	Wakarusa WWTP	6
5	Indiana	IN0024741	City of Wabash WWTP	7
5	Indiana	IN0024716	Veedersburg WWTP	4
5	Indiana	IN0025615	William Edwin Ross WWTP	5
5	Indiana	IN0032875	City of Kokomo Municipal Sanitation Utility	30
5	Indiana	IN0039314	City of Decatur WWTP	4
5	Indiana	IN0038318	Milford	1
5	Indiana	IN0035696	Mt. Vernon WWTP	3
5	Indiana	IN0033073	Evansville East WWTP	8
5	Indiana	IN0032972	Civil Town of Speedway WWTP	3
5	Indiana	IN0025674	City of Elkhart WWTP	39
5	Indiana	IN0032956	Evansville Westside WWTP	15
5	Indiana	IN0024554	City of Sullivan WWTP	5
5	Indiana	IN0032719	Elwood	15
5	Indiana	IN0032573	City of Columbus POTW	3
5	Indiana	IN0032476	Anderson WWTP	19
5	Indiana	IN0032468	Lafayette	13
5	Indiana	IN0032336	Connersville	5
5	Indiana	IN0032328	City of Peru WWTP	16

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
5	Indiana	IN0032191	City of Fort Wayne WWTP	41
5	Indiana	IN0031950	Indianapolis-South Port	0
5	Indiana	IN0032964	City of Crawfordsville WWTP	2
5	Indiana	IN0021628	Hartford City	17
5	Indiana	IN0022683	Town of Crothersville WWTP	4
5	Indiana	IN0022624	Columbia City WWTP	16
5	Indiana	IN0022608	City of Clinton POTW	6
5	Indiana	IN0022578	Chesterton Municipal STP	1
5	Indiana	IN0022462	Butler	1
5	Indiana	IN0022420	Boonville	1
5	Indiana	IN0022411	City of Bluffton WWTP	1
5	Indiana	IN0024660	Elden Kuehl Pollution Control Facility	2
5	Indiana	IN0021652	Eaton	2
5	Indiana	IN0022977	Gary WWTP	13
5	Indiana	IN0021474	Tipton Municipal STP	8
5	Indiana	IN0021466	Nappanee	13
5	Indiana	IN0021385	City of Knox WWTP	1
5	Indiana	IN0021369	Berne	3
5	Indiana	IN0021342	Oxford WWTP	3
5	Indiana	IN0021296	City of Angola WWTP	3
5	Indiana	IN0021270	Rushville	3
5	Indiana	IN0021245	Town of Brownsburg WWTP	2
5	Indiana	IN0022144	Albion	2
5	Indiana	IN0023604	City of Logansport WWTP	16
5	Indiana	IN0024520	City of South Bend WWTP	42
5	Indiana	IN0024473	City of Seymour WWTP	1
5	Indiana	IN0024414	Rensselaer	16
5	Indiana	IN0024406	Town of Redkey POTW	6
5	Indiana	IN0024023	Paoli Municipal STP	8
5	Indiana	IN0023914	City of New Castle WWTP	8
5	Indiana	IN0023752	Michigan City	2
5	Indiana	IN0022829	East Chicago S.D.	2
5	Indiana	IN0023621	Lowell Municipal STP	1
5	Indiana	IN0022934	Frankfort	1
5	Indiana	IN0023582	Ligonier WWTP	6
5	Indiana	IN0021105	Fairmount	16
5	Indiana	IN0021202	Plainfield Municipal STP	5
5	Indiana	IN0023302	Jeffersonville	16
5	Indiana	IN0023183	Indianapolis-Belmont	133
5	Indiana	IN0023132	City of Huntington WWTP	14

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
5	Indiana	IN0023060	Hammond WWTP	20
5	Indiana	IN0024562	Summitville	3
5	Indiana	IN0023736	Markle WWTP	2
5	Indiana	IN0020664	Avilla WWTP	4
5	Indiana	IN0020672	Auburn WWTP	4
5	Indiana	IN0020711	Waterloo Municipal STP	3
5	Indiana	IN0020745	Ossian WWTP	6
5	Indiana	IN0021211	Brazil Municipal STP	4
5	Indiana	IN0020362	North Manchester STP	8
5	Indiana	IN0020427	Bremen WWTP	4
5	Indiana	IN0020451	North Vernon WWTP	2
5	Indiana	IN0020516	Winamac Municipal STP	5
5	Indiana	IN0020567	South Whitley Municipal STP	2
5	Indiana	IN0020656	City of Kendallville WWTP	1
5	Indiana	IN0020770	Middletown	4
5	Indiana	IN0020940	Remington Municipal STP	1
5	Indiana	IN0020877	North Judson Municipal STP	2
5	Indiana	IN0020907	Rossville	2
5	Indiana	IN0020958	Fortville WWTP	12
5	Indiana	IN0020991	Plymouth Municipal STP	10
5	Indiana	IN0020346	New Haven STP	4
5	Indiana	IN0022560	Chesterfield WWTP	3
5	Indiana	IN0050903	City of Aurora WW Collection System	2
5	Michigan	MI0026069	Grand Rapids WWTP	19
5	Michigan	MI0020214	Norway WWTP	1
5	Michigan	MI0022802	Detroit WWTP	86
5	Michigan	MI0022284	Bay City WWTP	5
5	Michigan	MI0022152	Adrian WWTP	2
5	Michigan	MI0021695	Blissfield WWTP	2
5	Michigan	MI0021440	Wakefield WWSL	1
5	Michigan	MI0021083	Croswell WWTP	1
5	Michigan	MI0020656	Marysville WWTP	1
5	Michigan	MI0020362	Manistee WWTP	4
5	Michigan	MI0023001	Gladwin WWTP	1
5	Michigan	MI0020591	St. Clair WWTP	1
5	Michigan	MI0023973	Saginaw Township WWTP	1
5	Michigan	MI0025631	Menominee WWTP	1
5	Michigan	MI0025577	Saginaw WWTP	15
5	Michigan	MI0022853	East Lansing WWTP	2
5	Michigan	MI0022918	Essexville WWTP	1

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
5	Michigan	MI0023833	Port Huron WWTP	19
5	Michigan	MI0023701	Niles WWTP	8
5	Michigan	MI0023647	Mt. Clemens WWTP	1
5	Michigan	MI0023515	Manistique WWTP	1
5	Michigan	MI0023400	Lansing WWTP	32
5	Michigan	MI0023205	Iron Mountain-Kingsford WWTP	1
5	Michigan	MI0024058	Sault Ste Marie WWTP	7
5	Michigan	MI0026077	Grosse Pointe Farms CSO	7
5	Michigan	MI0025453	Martin RTB	2
5	Michigan	MI0025500	Milk River CSO	1
5	Michigan	MI0025534	Birmingham CSO	1
5	Michigan	MI0025542	Dearborn CSO	20
5	Michigan	MI0026085	Grosse Pointe Shores CSO	0
5	Michigan	MI0025585	Chapaton RTB	2
5	Michigan	MI0051811	Dearborn Heights CSO	1
5	Michigan	MI0051829	Redford Township CSO	1
5	Michigan	MI0051837	Inkster/Dearborn Heights CSO	1
5	Michigan	MI0051560	Wayne County/Livonia/Westland CSO	1
5	Michigan	MI0051551	Wayne County/ Livonia CSO	3
5	Michigan	MI0051462	Wayne County/ Inkster/Dearborn Heights CSO	2
5	Michigan	MI0026115	Oakland County SOCSDS 12 Towns RTF	1
5	Michigan	MI0026735	St. Joseph CSO	5
5	Michigan	MI0028819	River Rouge CSO	1
5	Michigan	MI0036072	Southgate/Wyandotte CSO RTF	2
5	Michigan	MI0037427	Oakland County-Acacia Park CSO	1
5	Michigan	MI0043982	North Houghton County W&SA CSO	2
5	Michigan	MI0051802	Livonia CSO	1
5	Michigan	MI0048879	Crystal Falls CSO	2
5	Michigan	MI0051471	Wayne County/Inkster CSO	10
5	Michigan	MI0051489	Wayne County/Dearborn Heights CSO	7
5	Michigan	MI0051497	Wayne County/Westland CSO	1
5	Michigan	MI0051501	Wayne County/Westland/Wayne CSO	0
5	Michigan	MI0051535	Wayne County/Redford/ Livonia CSO	8
5	Michigan	MI0051543	Wayne County/Garden City/Westland CSO	0
5	Michigan	MI0048046	Bloomfield Village CSO	1
5	Minnesota	MN0024571	Red Wing	1
5	Minnesota	MN0025470	MCWS-St. Paul	2
5	Minnesota	MN0046744	MCWS-Minneapolis	6
5	Ohio	OH0024139	City of Bowling Green	1
5	Ohio	OH0022471	Deshler WWTP	14

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
5	Ohio	OH0025151	Forest WWTP	3
5	Ohio	OH0025135	Findlay Water Pollution Control Center	18
5	Ohio	OH0025127	Fayette WWTP	15
5	Ohio	OH0025003	City of Elyria WWTP	27
5	Ohio	OH0024929	Delphos WWTP	7
5	Ohio	OH0024899	Defiance	43
5	Ohio	OH0024759	Columbus Grove	4
5	Ohio	OH0024741	Columbus-Southerly	2
5	Ohio	OH0025291	Fremont WWTP	13
5	Ohio	OH0024686	City of Clyde WWTP	4
5	Ohio	OH0025364	City of Girard WWTP	5
5	Ohio	OH0023981	City of Avon Lake	14
5	Ohio	OH0023957	Village of Attica	12
5	Ohio	OH0023914	Ashtabula	3
5	Ohio	OH0023884	Village of Ansonia WWTP	3
5	Ohio	OH0023833	City of Akron	38
5	Ohio	OH0023400	City of Wauseon	7
5	Ohio	OH0023396	Ohio City	5
5	Ohio	OH0022624	Marshallville WWTP	1
5	Ohio	OH0028118	City of Willard	2
5	Ohio	OH0024732	Columbus-Jackson Pike	29
5	Ohio	OH0026565	Village of Mingo Junction	6
5	Ohio	OH0027987	Warren	4
5	Ohio	OH0027952	Wapakoneta WWTP	4
5	Ohio	OH0027910	Van Wert	6
5	Ohio	OH0027898	Utica	1
5	Ohio	OH0027740	Toledo	38
5	Ohio	OH0027511	Steubenville	16
5	Ohio	OH0027332	City of Sandusky	17
5	Ohio	OH0027197	Portsmouth	10
5	Ohio	OH0025160	Fort Recovery WWTP	3
5	Ohio	OH0026671	Newark WWTP	26
5	Ohio	OH0022322	Put-In-Bay WWTP	3
5	Ohio	OH0026522	Middletown WWTP	8
5	Ohio	OH0026514	Middleport WWTP	13
5	Ohio	OH0026352	Marion Water Pollution Control	3
5	Ohio	OH0026263	City of McComb WWTP	3
5	Ohio	OH0026069	City of Lima WWTP	19
5	Ohio	OH0026026	Lancaster WWTP	31
5	Ohio	OH0026018	Lakewood WWTP	9

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
5	Ohio	OH0025852	Ironton WWTP	9
5	Ohio	OH0025771	Hicksville	3
5	Ohio	OH0026841	Oak Harbor	9
5	Ohio	OH0022578	Green Springs WWTP	1
5	Ohio	OH0020192	Village of Bradford	9
5	Ohio	OH0020117	North Baltimore	2
5	Ohio	OH0020001	Upper Sandusky	7
5	Ohio	OH0020338	Village of Paulding	2
5	Ohio	OH0020451	City of Milford WWTP	2
5	Ohio	OH0020974	Delta WWTP	11
5	Ohio	OH0022110	Newton Falls WWTP	28
5	Ohio	OH0021831	Montpelier WWTP	4
5	Ohio	OH0021725	Pomeroy	13
5	Ohio	OH0021491	Bremen	1
5	Ohio	OH0021466	McConnelsville	9
5	Ohio	OH0021326	Village of Payne WWTP	2
5	Ohio	OH0021261	Elmore WWTP	5
5	Ohio	OH0021148	Village of Pandora WWTP	10
5	Ohio	OH0021105	Hamler WWTP	6
5	Ohio	OH0020214	Toronto WWTP	7
5	Ohio	OH0021008	Perrysburg Water Pollution Control	4
5	Ohio	OH0027481	Springfield STP	58
5	Ohio	OH0020940	Arcanum WWTP	14
5	Ohio	OH0020893	Napoleon WWTP	3
5	Ohio	OH0020851	Bluffton WWTP	20
5	Ohio	OH0020664	Crestline WWTP	1
5	Ohio	OH0020591	Woodville	18
5	Ohio	OH0020559	Village of Caldwell WWTP	23
5	Ohio	OH0020524	Village of Swanton	27
5	Ohio	OH0020486	Village of Greenwich WWTP	14
5	Ohio	OH0021016	Village of Genoa	6
5	Ohio	OH0028177	Woodsfield WWTP	5
5	Ohio	OH0028185	Wooster	3
5	Ohio	OH0028223	City of Youngstown WTP	80
5	Ohio	OH0028240	Zanesville WWTP	25
5	Ohio	OH0029122	Village of Gibsonburg	3
5	Ohio	OH0031062	Euclid	18
5	Ohio	OH0043991	Northeast Ohio Regional Sewer District	126
5	Ohio	OH0048321	Dunkirk	6
5	Ohio	OH0049999	Eastern Ohio Regional Wastewater Authority	47

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
5	Ohio	OH0052604	City of Norwalk	3
5	Ohio	OH0052876	Port Clinton	2
5	Ohio	OH0052922	City of Bucyrus	22
5	Ohio	OH0052744	City of Fostoria	5
5	Ohio	OH0052949	Tiffin	39
5	Ohio	OH0058971	Luckey STP	4
5	Ohio	OH0058408	Metamora	12
5	Ohio	OH0126268	Lisbon WWTP	9
5	Ohio	OH0094528	Village of Malta	10
5	Ohio	OH0020613	Village of New Boston	2
5	Ohio	OH0105457	Hamilton County Commissioners	182
5	Wisconsin	WIL024767	Milwaukee MSD-Jones Island	120
5	Wisconsin	WI0025593	Superior Sewage Disposal System	3
7	Iowa	IA0042609	City of Keokuk STP	9
7	Iowa	IA0020842	City of Lake City STP	1
7	Iowa	IA0021059	City of Spencer STP	4
7	Iowa	IA0023434	City of Muscatine STP	5
7	Iowa	IA0025917	City of Mediapolis STP	1
7	Iowa	IA0027219	City of Ft. Madison STP	9
7	Iowa	IA0032433	City of Washington WWTP	8
7	Iowa	IA0036641	City of Council Bluffs STP	5
7	Iowa	IA0042650	City of Waterloo STP	7
7	Iowa	IA0043079	City of Burlington STP	12
7	Iowa	IA0047961	City of Wapello STP	2
7	Iowa	IA0058483	City of Williams STP	1
7	Iowa	IA0058611	Ottumwa STP	10
7	Iowa	IA0035947	City of Clinton STP	10
7	Iowa	IA0076601	Des Moines CSOs	18
7	Kansas	KS0038563	Kansas City WWTP	58
7	Kansas	KS0039128	Atchison City WWTP	7
7	Kansas	KS0042722	Topeka City of Oakland STP	6
7	Missouri	MO0024911	Kansas City, Blue River STP	5
7	Missouri	MO0117960	Moberly East WWTP	8
7	Missouri	MO0050580	Cape Girardeau WWTP	3
7	Missouri	MO0025178	MSD, Bissell Point WWTP	3
7	Missouri	MO0025151	MSD, Lemay WWTP	12
7	Missouri	MO0024929	Kansas City, Westside STP	2
7	Missouri	MO0023221	Macon WWTF	6
7	Missouri	MO0023043	St. Joseph WWTP	2
7	Missouri	MO0023027	Sedalia North WWTP	8

EPA Region	State	NPDES Permit No.	Facility Name	Number of Outfalls
7	Nebraska	NE0021121	Plattsmouth WWTF	1
7	Nebraska	NE0036358	Omaha Missouri River WWTF	25
8	South Dakota	SD0027481	City of Lead	1
9	California	CA0037681	Oceanside WPCP and Westside Wet Weather CSO System	7
9	California	CA0038610	Bayside Wet Weather Facilities WPCP	28
9	California	CA0079111	Sacramento Regional County S.D.	6
10	Alaska	AK0023213	Juneau-Douglas WWTP	3
10	Oregon	OR0027561	City of Astoria WWTP	38
10	Oregon	OR0026361	City of Corvallis WWRP	6
10	Oregon	OR0026905	City of Portland Columbia Blvd WWTP	55
10	Washington	WA0024074	City of Mt. Vernon WWTP	2
10	Washington	WA0023973	City of Port Angeles WWTP	5
10	Washington	WA0023744	City of Bellingham WWTP	2
10	Washington	WA0020257	City of Anacortes WWTP	3
10	Washington	WA0024490	Everett WPCF	18
10	Washington	WA0029181	West Point STP	34
10	Washington	WA0024473	Spokane WWTP and CSOs	24
10	Washington	WA0037061	City of Olympia	3
10	Washington	WA0029548	Snohomish WWTP	2
10	Washington	WA0029289	Bremerton WWTP	16
10	Washington	WA0031682	City of Seattle Collection System	110

Appendix E

Summary of CSO-Related Civil Judicial Actions Taken By EPA Prior to Issuance of the CSO Control Policy

Civil Judicial Actions Taken by EPA Under the National Municipal Policy

Region	State	Case Name/City Name	CSO Violation	Outcome
1	MA	Boston	CSOs causing impairment to Boston Harbor.	Went to trial resulting in court order for CSO abatement schedule; $425,000 penalty.
1	MA	City of New Bedford	Violation of CWA, and later consent decree.	Modified judicially ordered consent decree (filed 12/07/87, amended 04/28/95) modified schedule for CSO abatement; $150,000 penalty.
1	MA	Lowell	CSO bypasses, dry weather overflows in violation of permit.	Operation and maintenance improvements, elimination of dry weather overflows, submittal of CSO facility plan; $180,000 Civil Judicial penalty. Amended 6/29/01 to require separation.
1	MA	Lynn	Violation of CWA and later consent decree.	Judicially ordered consent decree (filed 11/02/89, amended 11/15/94) required CSO facility plan and schedule for CSO abatement; $95,000 penalty.
1	ME	City of Bangor	CSOs in violation of NPDES permit and three administrative actions.	Judicially ordered consent decree (issued 04/09/91, modified 06/28/91) required facilities plan and CSO abatement projects implementation; $20,000 penalty.
1	ME	City of South Portland	CSOs in violation of NPDES permit.	Judicially ordered consent decree (filed 04/16/92, amended 08/18/94) required POTW upgrade and CSO abatement program for NPDES permit compliance; $30,000 penalty.
2	NJ	North Bergen Township	Failure to meet construction schedule for CSO abatement.	Judicially ordered consent decree required schedule to achieve compliance; $56,000 penalty.
3	PA	City of Philadelphia	CSOs from prison facility.	Judicially ordered consent decree; $225,000 penalty.
5	IL	Metropolis	Failure to meet construction schedule in administrative order.	Judicially ordered consent decree required correction of CSO overflow structure; $17,500 penalty.

Civil Judicial Actions Taken by EPA Under the National Municipal Policy—Continued

Region	State	Case Name/City Name	CSO Violation	Outcome
5	IL	Paris	CSOs causing water quality problems.	CSO separation, testing, and first flush treatment; $20,000 penalty.
5	IN	Boonville	Wet weather untreated discharge from CSOs; dry weather overflows.	Judicially ordered 1987 consent decree required City to adequately maintain the CSS and improve plant operations; $26,000 penalty.
5	IN	Hammond	Violation of judicially ordered consent decree; dry weather CSOs.	Judicially ordered consent decree required implementation of plan to eliminate CSOs and dry weather overflows; $1,272,604 penalty.
5	IN	Madison	CSOs, inadequate O&M, and effluent limit violations.	Judicially ordered consent decree required development of CSO management plan; $30,000 penalty.
5	MI	Wayne County	CSOs contributing to public health advisories against swimming and nutrient loadings stimulate plant and algae growth in downstream water bodies including Lake Erie.	Judicially ordered 1994 consent decree; $413,000 penalty.
5	OH	Cincinnati Metropolitan Sewer District	Unauthorized dry weather discharges from CSOs.	Judicially ordered consent decree; $750,000 penalty.
5	OH	Portsmouth	CSOs causing water quality standards exceedances in the Scioto and Ohio Rivers.	Judicially ordered 1992 consent decree; $32,000 penalty.

Other Civil Judicial Actions Taken by EPA Prior to 1994

Region	State	Case Name/City Name	CSO Violation	Outcome
1	MA	Fall River	Unauthorized CSO discharges.	Administrative order, filed 1987.
1	MA	Fall River	Unauthorized CSO discharges.	Administrative order, filed 1989.
1	MA	Gloucester	Failure to complete CSO study and treatment plan as required by administrative order.	Consent Decree (filed 11/30/88).
1	MA	Swampscott	Failure to construct a secondary facility; failure to meet construction schedule; exceedance of effluent limits.	Judicial enforcement action filed 5/5/88 requiring completion of CSO analysis and development of a schedule for construction of CSO facilities.
1	ME	Portland	Unauthorized CSO discharges.	Administrative consent order for CSO abatement schedule.
1	NH	Portsmouth	Unauthorized CSO discharges.	Consent decree required LTCP.
2	NY	Niagara Falls	Dry weather overflows; inadequate O&M of CSS.	Consent decree (issued 3/13/87) required City to eliminate all dry weather overflows and submit final plans for repairs necessary to the CSS.
2	NY	Poughkeepsie	Dry weather overflows; discharging raw sewage into Hudson River.	Consent decree (signed 3/31/88) required City to eliminate all dry weather overflows; $55,000 penalty.
2	NY	Utica	Violation of effluent limits for BOD and TSS; dry weather overflows; O&M violations.	Consent Decree (filed 6/2/77) required City to eliminate dry weather overflows and conduct an SSES; $5,000 penalty.
5	OH	Bedford	CSOs exceeding discharge limits; inflow and infiltration deficiencies in collection system.	Consent Decree (filed 9/30/85) required the City to conduct a CSO facility study and implement a plan for appropriate treatment of CSOs; $27,500 penalty.
5	OH	Wellston	CSO discharges due to improper O&M; unpermitted bypass.	Consent Decree (filed 10/13/87).
5	MI	Menominee	Unauthorized CSO discharges.	Consent Decree (filed 4/21/88).
10	WA	Centralia	Infiltration and inflow into collection and treatment systems; inadequate O&M.	Consent Decree (filed 9/28/88).

Appendix F

Data Base Documentation

Data Base Documentation

1.0 Introduction

The purpose of this appendix is to document the onsite data collection effort for the CSO Report to Congress. The goal was to collect as much information on CSO communities as was available at the state and regional NPDES authorities(see Chapter 3 of this report for overall report methodology) . Teams were deployed to review NPDES authority files and to conduct introductory interviews with the state CSO coordinator, a representative from enforcement, and a representative from water quality standards. The data collection strategy focused on obtaining information necessary to comply with the requirements in the 2001 CSO Report to Congress. Data emphasized were the facility name, NPDES permit number, number of CSO outfalls, permit requirements for documentation of the NMC and development of an LTCP, and implementation of the NMC and LTCP. Other data, such as population and service area demographics, collection system characteristics, type of CSO controls being implemented, etc. were recorded as available during the file reviews. After collection, all data were processed into a relational Data Collection System (DCS) that serves as the basis for a comprehensive national database for the CSO program (currently under development).

The following sections of this appendix further describe the data collection effort:

- Section 2.0 documents the data collection and data entry processes.
- Section 3.0 describes the relational data base structure and content (i.e., data elements).
- Section 4.0 explains the QA/QC process to ensure data quality and completeness.

2.0 Data Collection

The data collection effort consisted of onsite NPDES authority interviews and file reviews. EPA data collection teams visited permitting authorities for nearly 90 percent of the CSO communities in the nation. During these visits, CSO coordinators and enforcement and water quality standards representatives were interviewed to characterize each state's approach and perspective towards implementing the CSO Control Policy. Following the interviews, collection teams reviewed permits and related files for each of the NPDES authority's CSO permittees.

Teams used two types of data collection forms to guide staff interviews and record file data. The first form was developed to facilitate discussions with the state CSO coordinator, a state water quality standards representative, and a state enforcement representative. A second form was developed to capture data collected during the file review for each CSO permit. The interview and data collection orms are included as Appendix F-1. Upon leaving the site, forms were processed, information was entered into the DCS (further discussed in Section 3 of this appendix), and copies were then filed for future reference. Details about the data collection teams, onsite interviews, and file review processes are described in the sections following.

2.1 Collection Teams

Collection teams consisted of a team leader and one to three team members. The team leader's responsibilities included coordinating site visits, serving as advisor to the data collection team, developing state fact sheets, and reporting on state programs, protocols, and findings. Team leaders were generally engineers who were well-versed in wastewater engineering; planning and technologies; CSO controls and the CSO Control Policy; and overall federal, state, and local roles in the NPDES permitting process.

A one-day training session for all data collection team members included an overview of the CSO Control Policy, explanation of CSO systems and control technologies, and mock training exercises. The exercises consisted of reviewing information that would typically be found onsite and completing sample data collection forms. Team members were able to interact and pose questions to aid in understanding the collection materials as well as CSO concepts and terminology. Team member responses and rationale were reviewed/critiqued at the end of the class. Feedback and further direction was provided. Data collection forms were revised based on feedback from the trainees.

2.2 Site Visits

2.2.1 Interviews

Collection teams requested interviews with the CSO coordinator and representatives from enforcement and water quality standards. The interviews served to establish an understanding of how states implemented the CSO Control Policy within the context of existing programs.

The state CSO coordinators served as the central point of contact, and acquainted the teams with state protocols and the types of information that might be available during the file review. The CSO coordinators were asked to estimate the number of communities with NMC or LTCP permit requirements; the number of NMC documents or LTCPs that have been received; and the number of these documents that had been approved to date. Other state CSO requirements, reporting and protocols were also discussed. This interview was generally conducted prior to or upon arrival at the site, and provided insight in to subsequent interactions with the enforcement and water quality standards staff in the area of CSO control.

State enforcement staff were interviewed to determine the state's approach for enforcing the CSO Control Policy, interaction with the regions on enforcement, primary types of enforcement actions taken for CSO-related permits, and any specific enforcement actions taken to date primarily because of CSOs. Water quality standards representatives were interviewed to understand the state's approach to considering CSO-impacted waters in relation to water quality standards reviews and revisions.

2.2.2 NPDES File Reviews

The file review process followed the introductory interview. Team members reviewed each CSO permit. The amount of time spent for review and data compilation ranged from 15 to 60 minutes per permit file. Types of documents considered in the file review process included:

- NPDES files (individual and general permits and permit applications)
- Report files (NMC documentation, LTCPs, annual reports, etc.)
- Inspection reports (especially those discussing the collection system, CSO outfalls, or implementation of either the NMC or LTCP)
- Enforcement and compliance files
- Correspondence files
- State policy or regulation specifically targeting CSOs and/or wet-weather water quality standards
- Others (O&M reports discussing WWTP implementation of the NMC, engineering studies on the WWTP or collection system, and watershed studies discussing CSO impacts on receiving water quality)

Team members recorded data and supplemental notes for the CSO permittee on the data collection form.

2.2.3 Data Collection Form

The data collection form was developed to simplify and standardize the data collection process. Form data elements were initially based on data needs identified for this report and on types of data typically maintained in NPDES permits, permit applications, NMC reports and LTCPs. The data collection form was first applied during a review of Maine's files. Adjustments to the form were made. The revised form was re-evaluated during the onsite review of Illinois' files. Final adjustments were made and this refined form was used for all subsequent reviews. The form design used proven form techniques to promote consistency. Subjective data elements were eliminated or avoided, and a limited number of carefully considered responses to each question were provided as check boxes or yes/no responses when possible. The form consists of 11 sections and is provided as Appendix F-1. Descriptions of each of the 11 sections follow.

Facility Information. The facility information section documents identifying characteristics for each permittee including facility name, mailing and facility addresses, NPDES permit number, contact persons, type of permitted facility, and other permittee characterization.

Development and Evaluation of Alternatives. The development and evaluation of alternatives section captures information regarding NMC and LTCP requirements and implementation. Team members were asked to determine whether each permittee was required to implement the NMC, whether that requirement was established in a permit or some other type of enforceable action, which controls were being implemented, and whether documentation had been submitted to the NPDES permitting authority. Similar data were collected for LTCPs, along with the overall status of LTCP implementation and types of approaches taken. Documented CSO controls completed apart from a formal LTCP requirement were also noted. When possible, data collected were supplemented with narrative notes.

Selection and Implementation of Controls. The selection and implementation of controls section collects data the characterizating CSO controls implemented or being implemented. A look-up table of categorized, CSO controls technologies (further discussed in section 3.2 of this appendix) was provided. Controls were broadly categorized as being either a source or in-system control. Source controls keep storm water or pollutants out of the CSS; whereas in-system controls require modification of the CSS to treat combined flow. Control implementation date and estimated capital costs were recorded where available. Control data was supplemented with notes on control implementation issues (including types of controls considered, financial considerations, etc.).

Effectiveness of Structural Controls. The effectiveness of structural controls section contains monitoring data and/or pollutant removal efficiencies for CSO control technologies. Data areas include pilot tests performed, pre-construction or post-construction monitoring data collected, and ambient receiving water data compiled.

Collection System Information. The collection system information section contains data that characterizes entities served by the CSO permit. An entity could be a town, region, or municipal district. Data elements include the physical service area, system attributes, and demographic data on populations served.

Flow and Treatment Information. The flow and treatment information section contains data elements for average daily flow to the WWTP, design and peak flow capacity, and additional CSO treatment types that might be unique to the permittee.

Discharges and Other Disposal Methods. The discharges and other disposal methods section includes the number of CSO permitted outfall points, yearly dry weather overflows, and discharge points with effluent receiving full or partial treatment. The details of specific outfalls, if available, are characterized in a later section.

System Characterization. The system characterization section contains data that describes the entire sewer system. Percentages of the sewer network consisting of each type (combined or separate), as well as sewer length and service area (acreage) are the key data elements. Where available, data reflecting changes in the system throughout time are recorded. CSO discharges to sensitive areas are also characterized in this section.

Receiving Water Description. The receiving water description section contains lists each water body that receives discharge from either the WWTP or CSO outfall. Data elements include the receiving water name, watershed, and data on whether or not a CSO-related water quality standards review had been conducted.

Water Quality Data. The water quality data section records any water quality data being collected as part of a CSO study. If available, documents reporting data for typical parameters were photocopied and attached to the data collection form.

Outfall Description. The outfall description section records information on each of the CSO outfalls, including location (both street address and longitudinal/latitudinal coordinates, if available), number of annual CSO events, estimated annual CSO volume, and whether the outfall is treated or untreated.

2.3 Data Entry

After data collection teams gathered the necessary information during site visits, completed data collection forms were transmitted to the data management team. The data management team was comprised of a data team leader, a data manager, and the data entry team. The data manager and data entry team reviewed the collection form, resolvedissues of missing or indecipherable information, and performed data entry and data QA/QC.

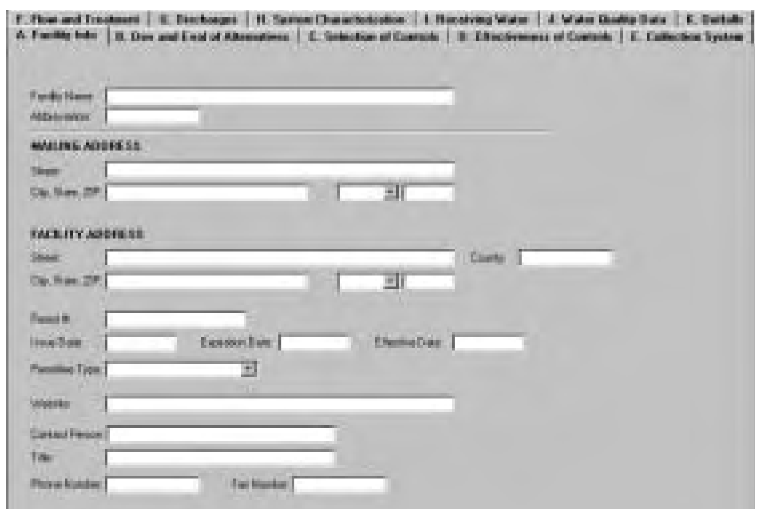


Figure F-1. DCS Data Entry Form

The data manager evaluated all incoming data forms for completeness and consistency. Prior to form review, the data manager met with the data collection team leader to gain a better understanding of the NPDES authority's protocols for implementing the CSO policy, and to ensure that permittees in different states were characterized similarly. All data collection forms were reviewed and annotated to facilitate data entry. Incomplete and questionable field entries were flagged for follow up with the data team leader, the state, or the region. After this review and follow-up procedure was completed, the data collection forms were initialed by the data manager and distributed to a data entry team (see section 3 of this appendix). The data entry team used an electronic data entry form designed in Microsoft Access to transfer information from the collection forms into the DCS. Figure F-1 shows a screen capture of the Access data entry form. Data entry staff completed this process by initialing and placing a copy of the form in a filing system dedicated for this purpose. Additional QA/QC steps taken with regard to the data are described in Section 4 of this appendix.

3.0 CSO Report to Congress Data Collection System

Microsoft Access 2000 was used to develop the CSO Report to Congress DCS to facilitate logging data gathered from NPDES authority file reviews into an electronic, relationally-linked, queriable, flexible platform. Flexibility was considered essential to accommodate new demands as results of the data collection effort were tested, and to allow future expansion and data transfer. Data contained in the DCS will serve as the basis for a more comprehensive, national relational data base system for the CSO program.

The primary structure of the DCS is described in detail in Section 3.1 of this appendix. Next, Section 3.2, discusses the peripheral components of the DCS that were added to facilitate data entry, aid in data queries, and to assist with QA/QC.

3.1 Primary Structure of the DCS

The DCS consists of 36 linked tables whose organizational structures are loosely based upon the outline established in the CSO Data Collection Form. Figure F-2 diagrams the tables, relationships, and key fields of the DCS.

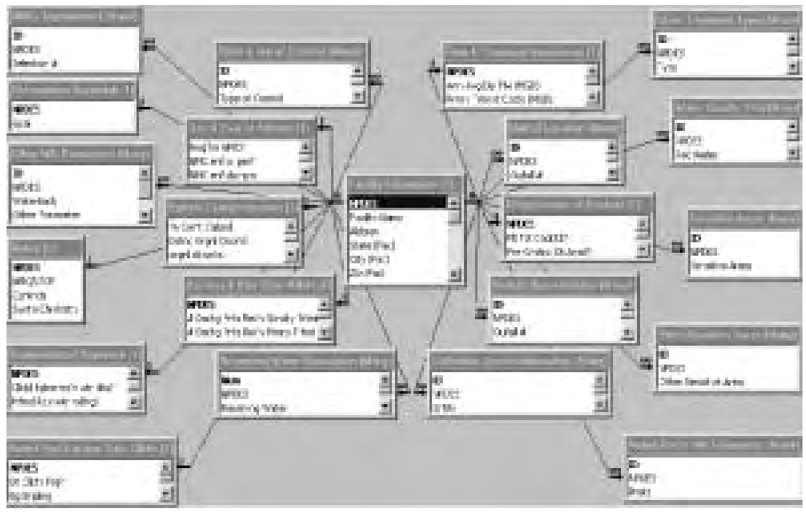


Figure F-2. DCS Tables, Relationships and Key Fields

Tables are named according to the data contained (from the data collection form) and their relationship to the NPDES permit number (a unique identifier for permits). For example, if a table contains data that has a one-to-one relationship with the NPDES permit number (a single entry for each permittee), "(1)" follows the table name. If a table contains information having a one-to-many relationship with the NPDES permit number (several entries for each permittee), "(Many)" is appended to the table name. Descriptions for each table (including field names, formats, and descriptions) are listed in the following sections. The title for each section corresponds to the related subdivision on the data collection form. As displayed in this figure, fields highlighted in bold text are primary key fields, which contain values that uniquely identify the data. Fields formatted in italic text are linked to primary key fields of another table. Field descriptions followed by "(Lookup)" restrict data entries to a predefined list from a lookup table. Lookup tables are discussed section 3.2 of this appendix.

3.1.1 Facility Information

"Facility Information (1)" is the main table from which all other tables are referenced. It contains basic information about each permittee such as NPDES number, facility name, location, and contact information. The primary key field for this table is the NPDES permit number, which is linked to all of the tables in DCS. This link ensures that data relating to each permittee can be appropriately identified. Table attributes of "Facility Information (1)" are listed in Table F-1.

3.1.2 Development and Evaluation of Alternatives

Table "Dev & Eval of Altrntvs (1)" contains data regarding NMC and LTCP implementation. NPDES permit number is the primary key field. Table F-2 attributes are detailed in Table F-2.

Demonstrated implementation of the NMC is captured in a separate table entitled "NMC Implemented (Many)". The primary key field for this table (and all other tables having a one-to-many relationship) is ID: a unique, sequential number generated by Access. By formatting this table with a one-to-many relationship, each permittee can be associated with several NMCs, as demonstrated in Table F-3.

Each entry in this table has a corresponding NPDES permit number and a selection number that describes the NMC (1-9). To indicate which of the NMCs were implemented, either the applicable NMC corresponding numbers, or one of the additional options, were selected. Additional options include "All 9 controls have been implemented" (111), "None of the NMC have been implemented" (999), and "Cannot determine" (888). Table attributes of "NMC Implemented (Many)" are listed in Table F-4.

Table F-1: Facility Attributes of Facility Information (1)

Field Name	Format	Description
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Facility name	Text	Name of the facility, town, or sanitary authority holding the NPDES permit
Abbrev	Text	Common abbreviation of the permittee's name
State (Fac)	Text	State where the facility is located (Lookup)
City (Fac)	Text	City where the facility is located
Zip (Fac)	Text	Zip code for the facility
Street (Fac)	Text	Address for the facility
City (Mail)	Text	City in the facility's mailing address
State (Mail)	Text	State in the facility's mailing address (Lookup)
Zip (Mail)	Text	Zip code in the facility's mailing address
Street (Mail)	Text	Mailing address
County	Text	County in which the facility is located
Contact Person	Text	Cognizant official for the facility
Title	Text	Title of cognizant official
Phone number	Text	Contact number for cognizant official
Fax number	Text	Fax number for cognizant official
Permit Issue	Date/Time	NPDES permit issuance date
Permits Exp	Date/Time	NPDES permit expiration date
Permit Eff	Date/Time	NPDES permit effective date
Permittee Type	Number	The permittee may be classified as owning both a WWTP and collection system (WWTP), or a satellite collection system only (SCS). (Lookup)
Website	Text	Permittee's website
Total Pop	Number	Population served by the permittee
Trtmnt Fac	Text	Facility that treats sanitary flow if the permittee is a satellite collection system
Status	Text	A flag signaling that the permittee has completely separated (S) or eliminated (E) its discharge points
Category	Text	The permittee may be classified as a MAJOR or MINOR depending on WWTP flow (classification from EPA's PES data base)

Table F-2: "Dev & Eval of Altrntvs (1)" Table Attributes

Field Name	Format	Description
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Req for NMC?	Number	Is the permittee required to implement the NMC? (Lookup)
NMC enf or per?	Number	If so, are the NMC being required via and ENFORCEABLE mechanism or a PERMIT? (Lookup)
NMC enf dscrptn	Text	Description of the enforceable mechanism, if applicable
NMC Docu Submitted	Number	Has NMC documentation been submitted to NPDES authority? (Lookup)
NMC sub date	Date/Time	Date NMC documentation was submitted to NPDES authority
Req to develop LTCP?	Number	Is the permittee required to develop a LTCP? (Lookup)
LTCP Req date	Date/Time	Date the LTCP is required to be submitted to the NPDES authority
LTCP enf or per	Number	Is the LTCP being required via an ENFORCEABLE mechanism or a PERMIT? (Lookup)
LTCP enf descrptn	Text	Description of the enforceable mechanism, if applicable
LTCP Submitted to State?	Number	Has the LTCP been submitted to the NPDES authority? (Lookup)
LTCP submit date	Date/Time	Date LTCP was submitted to NPDES authority
LTCP approved by State	Number	Has the LTCP been approved by the NPDES authority? (Lookup)
LTCP appr date	Date/Time	Date the LTCP was approved by the NPDES authority
LTCP pred compl w/ WQS	Number	Does the LTCP predict compliance with current water quality standards? (Lookup)
LTCP imp initiated?	Number	Has LTCP implementation begun? (Lookup)
LTCP init Date	Date/Time	Date LTCP implementation began
LTCP imp complete?	Number	Has the permittee completed LTCP implementation? (Lookup)
LTCP compl date	Date/Time	Date LTCP implementation was completed
Coll Sys Mdl Dvlpd	Number	Has the permittee developed a collection system model? (Lookup)
LTCP approach	Number	The LTCP approach may be either 1) PRESUMPTION or 2) DEMONSTRATION. (Lookup)
Target Date for LTCP imp	Date/Time	Target date for completing LTCP implementation
Capital Cost of LTCP controls	Number	Capital cost of implementing all controls outlined in LTCP
Current Trtmnt %	Number	% Volume of combined sewage in collection system which is captured for treatment
CSO cntrls outside LTCP?	Number	Has the community implemented CSO controls outside of a LTCP? (Lookup)
NMC impcts in LTCP?	Number	Were the impacts of the NMC considered in the LTCP? (Lookup)

Table F-3: Example of One-to-Many Data Relationship

ID	NPDES	Selection #	Description
40	ST0000001	1	Proper O&M programs for the sewer system and the CSOs
41	ST0000001	2	Maximum use of the collection system for storage
42	ST0000001	4	Maximization of flow to the POTW for treatment

Table F-4: "NMC Implemented (Many)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Selection #	Number	NMC that were implemented by the permittee. (Lookup)

LTCP methodology (presumption or demonstration) data is maintained separately from the table "Dev & Eval of Altrntvs (1)". Permittees choosing the presumption approach are noted as having one of three primary goals (as defined in EPA's LTCP Guidance). "Presumption Approach (1)" contains information on whether an LTCP is based on average number of overflows, a 85 percent capture by volume or an 85 percent reduction in the pollutant mass. The demonstration approach data includes whether the permittee has collected baseline water quality data, developed a systems model, and demonstrated compliance with effluent limitations. This data is contained in "Demonstration Approach (1)" table. The attributes for these tables are listed in Tables F-5 and F-6, respectively.

Table F-5: "Presumption Approach (1)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Selection #	Number	NMC that were implemented by the permittee. (Lookup)

Table F-6: "Demonstration Approach (1)" Table Attributes

Field Name	Format	Description
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Cllctd bslne rec'v wtr dta?	Number	Has the permittee collected data for baseline conditions in the receiving waters? (Lookup)
Prfmd Rc'v wtr mdlng?	Number	Has the permittee performed receiving water modeling? (Lookup)
Dmstrte compl w/ eff lmts?	Number	Has the permittee demonstrated compliance with effluent limits? (Lookup)

3.1.3 Selection and Implementation of Controls

Table "Slctn & Imp of Controls (Many)" includes data on CSO control technologies that were or are being implemented. The Number field in this table relates to a "lookup table:" a predefined list of common control technologies that can be referenced by number (similar to the way that the NMC are referenced by a unique number). Lookup tables are described in more detail in Section 3.2 of this appendix. "Slctn & Imp of Controls (Many)" also lists estimated completion dates and capital costs for each control. Table attributes are detailed in Table F-7.

Table F-7: "Slctn & Imp of Controls (Many)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Type of Control	Number	CSO controls may be either source or in-system controls. (Lookup)
Number	Text	A LTI predefined list of common CSO control technologies. (Lookup)
Date	Date/Time	Date the selected controls were implemented
Cost	Number	Estimated capital cost of specified CSO controls

3.1.4 Effectiveness of Structural Controls

Table "Effectiveness of Controls (1)" contains data regarding pilot tests and monitoring data for structural controls that have been implemented. The primary key field for this table is the NPDES permit number. Table attributes are listed in Table F-8.

Table F-8: "Effectiveness of Controls (1)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Type of Control	Number	CSO controls may be either source or in-system controls. (Lookup)
Number	Text	A LTI predefined list of common CSO control technologies. (Lookup)
Date	Date/Time	Date the selected controls were implemented
Cost	Number	Estimated capital cost of specified CSO controls

Data for ambient receiving water monitoring that was available at the NPDES authority is included in the "Ambnt Rec'v Water Data Cllctn (1)" table. If a list of specific monitored parameters was available, the data was captured separately in "Ambnt Rec'v Wtr Parameters (Many)" table. Table attributes are shown in Tables F-9 and F-10, respectively.

Table F-9: "Ambnt Rec'v Wtr Data Cllctn (1)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Type of Control	Number	CSO controls may be either source or in-system controls. (Lookup)
Number	Text	A LTI predefined list of common CSO control technologies. (Lookup)
Date	Date/Time	Date the selected controls were implemented
Cost	Number	Estimated capital cost of specified CSO controls

Table F-10: "Abnt Rec'v Wtr Parameters (Many)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Prmtr	Text	The ambient receiving water parameter that was studied

3.1.5 Collection System Information

CSO permittees might treat wastewater, or own or maintain collection systems for several towns, regions, or municipal districts. Data about these "entities" such as population and collection system type (combined or separate) are stored in the "Collection System Information (Many)"table. Table attributes are listed in Table F-11.

Table F-11: "Collection System Information (Many)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Prmtr	Text	The ambient receiving water parameter that was studied

3.1.6 Flow and Treatment Information

WWTP capacity and average daily flow are stored in the "Flow and Treatment Information (1)" table. When available, data includes design and peak flow capacities. Table attributes are listed in Table F-12.

Table F-12: "Flow and Treatment Information (1)" Table Attributes

Field Name	Format	Description
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Ann Avg Dly Flw (MGD)	Number	Annual average daily flow
Prmry Trtmnt Cpcty (MGD)	Number	Design primary treatment capacity
Scndry Trtmnt Cpcty (MGD)	Number	Design secondary treatment capacity
Pk Flw Prmry Trtmnt Cpcty (MGD)	Number	Peak flow primary treatment capacity
Pf Flw Scndry Trtmnt Cpcty (MGD)	Number	Peak flow secondary treatment capacity
CSO bypasses?	Number	Are CSO-related bypasses authorized? (Lookup)
Partly Trtd Eff & Trtd Flws Cmbnd?	Number	Are partially treated effluents combined with fully treated flows prior to discharge? (Lookup)

When available, additional data for CSO treatment at (or before) the WWTP (other than secondary treatment) was collected. Common treatment types include lagoons, storm water retention basins, and swirl concentrators. These data are stored in the "Other Treatment Types (Many)" table. This table was established with a one-to-many relationship because a particular permittee might utilize several different treatment technologies. Table attributes for "Other Treatment Types (Many)" are listed in Table F-13.

Table F-13: "Other Treatment Types (Many)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Type	Text	Alternative or additional CSO treatment (other than primary or secondary)
Capacity (MGD)	Number	Capacity provided by the alternative treatment

3.1.7 Discharges and Other Disposal Methods

Table "Dischrgs & Othr Displ Mthds (1)" contains data for permitted CSO outfalls, emergency overflow points, and dry weather overflows to waters of the U.S. The primary key field is NPDES number, which associates this information with other details about each permittee. See Table F-14 for the structure of "Dischrgs & Othr Displ Mthds (1)" table.

Table F-14: "Dischrgs & Othr Displ Mthds (1)" Table Attributes

Field Name	Format	Description
NPDES	Text	The National Pollutant Discharge Elimination System permit number
# Dschg Pnts Rec'v Scndry Trtmt	Number	Number of discharge points with effluent receiving full (secondary) treatment
# Dschg Pnts Rec'v Prmry Trtmt	Number	Number of discharge points with effluent receiving partial (secondary) treatment ONLY
# Orgnl CSP Points	Number	Original number of CSO permitted outfall points
# Crrnt CSO Points	Number	Current number of CSO permitted outfall points
CSO Pnts Chng Date	Date/Time	Date CURRENT number of CSO points was/is effective
# Emergency Ovrflws	Number	Number of constructed emergency overflows prior to the WWTP
Avg DWO/yr	Number	Average number of dry weather overflows per year

3.1.8 System Characterization

The "System Characterization (1)" table contains data about the make-up of the collection system. The percentage of the collection system consisting of combined sewers, the length of the pipes in the combined sewer system, and the total number of acres served by the collection system as a whole are all included. The properties of "System Characterization (1)" are shown in Table F-15.

Table F-15: "System Characterization (1)" Table Attributes

Field Name	Format	Description
NPDES	Text	The National Pollutant Discharge Elimination System permit number
% Orgnl Cmbnd	Number	Original percentage of the collections system that was comprised of combined sewers
% Crrnt Cmbnd	Number	Current percentage of the collection system that is comprised of combined sewers
Dstnc Orgnl Cmbnd	Number	Original combined collection system length
Orgnl cb units	Text	Unit for the original CSS length measurement
Dstnc Crrnt Cmbnd	Number	Current combined collection system length
Crrnt cb units	Text	Unit for the current CSS length measurement
Ttl Length Srvd	Number	Total (CSS+SSS) collection system length
Ttl Length Units	Text	Units for the total collection system length measurement
Acres Orgnl Cmbnd	Number	Acres originally served by the combined collection system
Acres Crrnt Cmbnd	Number	Acres currently served by the combined collections system
% Orgnl Sprt	Number	Original percentage of the collection system that was comprised of separate sanitary sewers
% Crrnt Sprt	Number	Current percentage of the collection system that is comprised of separate sanitary sewers
Dstnc Orgnl Sprt	Number	Original separate sanitary system length
Orgnl sp units	Text	Unit for the original SSS length measurement
Dstnc Crrnt Sprt	Number	Current separate sanitary system length
Crrnt sp units	Text	Unit for the current SSS length measurement
Acres Orgnl Sprt	Number	Acres originally served by the separate sanitary collection system
Acres Crrnt Sprt	Number	Acres currently served by the separate sanitary collection system
Ttl Acrs Srvd	Number	Total acres served by the collection system
Senstv Areas?	Number	Are there any CSO discharges to sensitive areas? (Lookup)

If a permittee has CSO discharges to sensitive areas, relevant data are located in the "Sensitive Areas (Many)" Table. The table references a lookup table: a pre-defined list of common sensitive areas. Lookup tables are described in detail in Section 3.2 of this appendix. Any receiving water sensitive area designations that are not on the pre-defined list must be recorded in the "Other Sensitive Areas (Many)" table. Table attributes are listed in Tables F-16 and F-17, respectively.

Table F-16: "Sensitive Areas (Many)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Sensitive Areas	Number	A predefined list of sensitive area classifications for the waterbody. (Lookup)

Table F-17: "Other Sensitive Areas (Many)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Other Sensitive Area	Text	Receiving water sensitive area categories that were not on LTCP predefined list

3.1.9 Receiving Water Description

Water bodies that receive discharge from either the WWTP or CSO outfalls are listed in the "Receiving Water Description (Many)" table. Data captured in this table include the watershed effected by the discharge and whether a CSO water quality standards review has been completed. Table attributes are listed in Table F-18.

Table F-18: "Receiving Water Description (Many)" Table Attributes

Field Name	Format	Description
Num	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Receiving Water	Text	Receiving waters for the WWTP discharge and CSO discharge points
Watershed	Text	Watershed influenced by the permittee's discharges
CSO WQS Review Complete?	Number	Has a CSO-related water quality standards review been performed for the receiving water? (Lookup)

3.1.10 Water Quality Data

Where available from the NPDES authority, wet weather monitoring data were recorded in the "Water Quality Data (Many)" table. The most commonly measured water quality parameters are listed. Other water quality parameters monitored were recorded in the "Other WQ Parameters (Many)". To allow maximum flexibility, both of these tables were formatted with a one-to-many relationship. Table attributes are listed in Tables F-19 and F-20, respectively.

Table F-19: "Water Quality Data (Many)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Rec Water	Text	Receiving waters on which wet weather or CSO studies were performed
BOD	Text	Measured BOD value
BOD units	Text	Units of BOD measurement
CBOD	Text	Measured CBOD value
CBOD units	Text	Units of CBOD measurement
DO (mg/L)	Text	Measured DO value
TSS	Text	Measured TSS value
TSS units	Text	Units of TSS measurement
Fecal (MPN/100mL)	Text	Measured fecal coliform value
E. Coli (MPN/100mL)	Text	Measured E. Coli value
Enterrococci (MPN/100mL)	Text	Measured enterroccoci value

Table F-20: "Other WQ Parameters (Many)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Waterbody	Text	Waterbody for which water quality data was collected
Other Parameter	Text	Water quality parameter studied that was not on LTI predefined list
Unit	Text	Units for the water quality parameter
Value	Text	Measured value for the water quality parameter

3.1.11 Outfall Description

Outfall data is maintained in two tables: one that lists outfall locations (longitude, latitude, and street addresses, if available), and another that contains CSO discharge characteristics (number of annual CSO events, average annual discharge volume). Data is recorded for multiple outfalls and years. To accommodate these variables, the tables "Outfall Location (Many)" and "Outfall Characteristics (Many)" both have one-to-many relationships. An NPDES number and a permittee assigned outfall number identify each outfall. Table attributes are listed in Tables F-21 and F-22, respectively.

Table F-21: "Outfall Location (Many)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Waterbody	Text	Waterbody for which water quality data was collected
Other Parameter	Text	Water quality parameter studied that was not on LTI predefined list
Unit	Text	Units for the water quality parameter
Value	Text	Measured value for the water quality parameter

Table F-22: "Outfall Characteristics (Many)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Waterbody	Text	Waterbody for which water quality data was collected
Other Parameter	Text	Water quality parameter studied that was not on LTI predefined list
Unit	Text	Units for the water quality parameter
Value	Text	Measured value for the water quality parameter

3.1.12 Notes

During the onsite NPDES authority file review, supplemental narratives were included to clarify implementation of the NMC and LTCP, to adequately describe types of controls implemented, and to provide necessary system characterization data. These supplemental data are recorded in the "Notes (1)" tsable, the attributes of which are listed in Table F-23.

Table F-23: "Notes (1)" Table Attributes

Field Name	Format	Description
ID	AutoNumber	A unique sequential number generated by ACCESS
NPDES	Text	The National Pollutant Discharge Elimination System permit number
Waterbody	Text	Waterbody for which water quality data was collected
Other Parameter	Text	Water quality parameter studied that was not on LTI predefined list
Unit	Text	Units for the water quality parameter
Value	Text	Measured value for the water quality parameter

3.2 Additional Components of the DCS

Lookup tables simplify data entry, add a built-in level of quality control, and facilitate DCS queries by providing a predefined list of commonly used values for a user to choose from. These items can each be referenced by a unique numerical value. In the DCS, lookup tables are used to provide Yes/No answers, a list of state abbreviations, lists of CSO control technologies and other information that is generally more static or predefined. The following are the key lookup tables for the DCS.

"Permittee Type (Lookup)" (Table F-24) was created for the Facility Information table. All CSO permittees fall into one of the following two categories: Publicly Owned Treatment Works - POTW (WWTP) or satellite collection system (SCS). CSO permittees that operate a POTW connected to a combined sewer area were categorized as WWTP, while permittees that only operate a combined sewer collection system and transfer flow to a POTW were categorized as an SCS.

Table F-24: "Permitee Type (Lookup)" Table

ID	Permittee Type	Description
1	WWTP	Permittee owns a WWTP and a collection system
2	SCS	Permittee owns a satellite collection system ONLY

"Enf or Per (Lookup)" (Table F-25) was developed to describe NMC and LTCP implementation in the "Dev and Eval of Altrntvs (1)" table. During data collection, team members were required to complete fields noting how the NMC and LTCP were being required (or not being required). If this could not be determined, a question mark was chosen. This methodology was continued throughout the data entry process; however most of these uncertainties were resolved during the QA/QC process.

Table F-25: "Enf or Per (Lookup)" Table

ID	Response	Description
1	ENF	The requirement is being implemented through an enforcement action
2	PER	The requirement is being implemented through a permit
3	?	The requirement is being implemented through an unknown method

Table F-26: "NMC Implemented (Lookup)" Table

Selection #	Controls Implemented
1	Proper O&M programs for the sewer system and the CSOs
2	Maximum use of the collection system for storage
3	Review of pretreatment requirements to minimize CSO impacts
4	Maximization of flow to the POTW for treatment
5	Prohibition of CSOs during dry weather
6	Control of solid and floatable materials in CSOs
7	Pollution Prevention
8	Public Notification
9	Monitoring
111	All 9 controls have been implemented
888	Cannot determine which controls have been implemented
999	No controls have been implemented

"NMC Implemented (Lookup)" (Table F-26) was developed for the "Dev and Eval of Altrntvs (1)" table to allow only the selection number to be recorded and stored in the DCS (the textual description could be relationally-linked and accessed via the lookup table).

"LTCP Approach (Lookup)" (Table F-27) and "Presumption (Lookup)" (Table F-28) were developed to describe LTCP development. According to EPA's LTCP guidance document, permittees must use either a presumption or demonstration approach in developing their LTCP. If the presumption approach is chosen, implementation must satisfy one of three goals listed in the "Presumption (Lookup)" table.

Table F-27: "LTCP Approach (Lookup)" Table

ID	Approach	Description
1	PRESUMPTION	"Presumption approach" as defined by US EPA's LTCP guidance document
2	DEMONSTRATION	"Demonstration approach" as defined by US EPA's LTCP guidance document

Table F-28: "Presumption (Lookup)" Table

ID	Goal
1	Limit # overflow events per year
2	Capture at least 85% wet weather combined sewage volume per year
3	Eliminate or reduce mass of pollutants to 85% capture requirement

"Selection and Implementation of Controls (Many)" stores the control ID from a list of commonly used CSO control technologies: "Source N In System Controls (Lookup)" (Table F-30). Controls fall under one of two categories: source or in-system ("Control Types (Lookup)" in Table F-29).

Table F-29: "Control Types (Lookup)" Table

ID	Control Type	Description
3	Source	Source controls prevent storm water from entering the collection system
4	In System	In System controls require some type of modification to the collection system

Table F-30: "Source N In System (Lookup)" Table

Number	Description	Number	Description
1.1	Animal waste removal	4.20	Outfall Elimination
1.10	Solid waste reduction and recycling	4.3	Combined sewer flushing
1.11	Storm drain stenciling	4.4	Tidegates
1.12	Street sweeping/cleaning	4.5	Flow diversion
1.13	Water conservation	4.6	Flow throttling devices
1.2	Catch basin cleaning	4.7	Hydroslide™ flow regulator
1.3	Commercial/industrial pollution prevention	4.8	Infiltration/inflow control
1.4	Enforcement of litter laws	4.9	Inflatable dams
1.5	Fertilizer and pesticide management	5.1	Abandoned pipelines
1.6	Industrial pretreatment	5.10	Storage tunnels and conduits
1.7	Public education programs	5.11	Upgraded pump station capacity
1.8	Sediment and erosion control	5.12	Upgraded WWTP capacity
1.9	Snow removal and deicing control	5.2	Catch basin storage tanks
2.1	Area drain, foundation drain, and roof leader disconnection	5.3	Earthen basins
2.10	Stormwater infiltration sumps	5.4	First flush tanks
2.11	Constructed wetlands	5.5	In-receiving water flow balance
2.2	Basement sump pump redirection	5.6	In-sewer storage
2.3	Flow restrictions and catch basin inlet modification	5.7	Lagoons
2.4	Flow slipping	5.8	Concrete retention tanks
2.5	Grassed swales and infiltration trenches (new construction)	5.9	Closed concrete retention tanks
2.6	Infiltration basins (new construction)	6.1	Abandoned primary facilities
2.7	On-street surface storage	6.10	Primary sedimentation
2.8	Porous pavements	6.11	Swirl concentrators and vortex separators
2.9	Storm water detention basins	6.2	Carbon adsorption
3.1	Baffles (only certain locations)	6.3	Carrier-enhanced settling
3.2	Catch basin hoods	6.4	Compressed media filters

Table F-30: "Source N In System (Lookup)" Table Continued

Number	Description	Number	Description
3.3	Catch basin trash buckets	6.5	Dissolved air flotation
3.4	Containment booms and barrier curtains	6.6	Fine screens and microstrainers
3.5	Continuous deflective separation systems	6.7	Flocculation (w/ chemical treatment for removal at the WWTP)
3.6	Floating netting units	6.8	Helical bend regulator/concentrator
3.7	In-line netting	6.9	High rate filtration
3.8	Skimmer vessels	7.1	Biological aerated filters
3.9	Screens and trash racks	7.2	Contact stabilization
4.1	Air-regulated siphons	7.3	Fluidized bed filtration
4.10	Manhole maintenance	7.4	Rotating biological contactors
4.11	Motor- or hydraulically operated sluice gates	7.5	Treatment lagoons
4.12	Polymer injection	7.6	Trickling filtration
4.13	Real-time flow control	8.1	Calcium hypochlorite
4.14	Sewer rehabilitation	8.2	Chlorine gas
4.15	Sewer separation (in limited areas)	8.3	Chlorine dioxide
4.16	Static flow control	8.4	Ozone
4.17	Submerged catch basin outlets and siphons	8.5	Peracetic acid
4.18	Turbo™ vortex valves	8.6	Sodium hypochlorite (high rate addition)
4.19	Variable flow control	8.7	Ultraviolet radiation
4.2	Bending weirs	8.8	Disinfection (unspecified type)

The "System Type (Lookup)" table (Table F-31) lists the three collection system types. This lookup table was used in conjunction with the "Collection System Information (Many)" table.

Table F-31: "System Type (Lookup)" Table

ID	System Type	Description
1	Combined	Collection system is comprised of combined sewers
2	Separate	Collection system is comprised of sanitary sewers
3	Mixed	Collection system is comprised of a combination of combined and sanitary sewers

"Sensitive Areas (Lookup)" table (Table F-32) was developed to provide a list of the most common receiving water sensitive area designations. If a permittee discharged to a sensitive area other than one given, the data entry team selected option #7 and then described the classification in another table.

Table F-32: "Sensitive Areas (Lookup)" Table

ID	Sensitive Areas
1	Outstanding National Resource Waters
2	National Marine Sanctuaries
3	Waters with threatened or endangered species
4	Primary contact recreation waters
5	Public drinking water intakes
6	Shellfish beds
7	Other

CSO outfall data was often given as an average of several years or a modeled estimate. "Outfall Data Type (Lookup)" (Table F-33) lists the most common data types. All outfalls can be described as being either treated or untreated, as defined in "Trtd or Untrtd (Lookup)" (Table F-34).

Table F-33: "Outfall Data Type (Lookup)" Table

ID	Data Type	Description
1	AVG	Signals that the data collected is an average of several values
2	AVG2	Signals that the data collected is a 2-year average
3	AVG3	Signals that the data collected is a 3-year average
4	EST	Signals that the data collected is a modeled estimate
5	?	The data type is unknown

Table F-34: "Trtd or Untrtd (Lookup)" Table

ID	T & U	Description
1	T	CSO discharge point is treated
2	U	CSO discharge point is untreated

4.0 Quality Assurance And Control Protocol For The Data Collection System

The data collection effort for the CSO Report to Congress involved several stages of QA/QC. As previously mentioned, the first stage began onsite where team leaders reviewed completed data collection forms, clarified details as necessary, and initialed the forms indicating approval. Upon transmittal of the forms from the data collection team to the data management team, the data manager reviewed the forms for consistency and completeness. Data inconsistencies and anomalies were flagged by the data manager and resolved based on discussions with the data team leader or, if necessary, the permitting authority. The data manager and data team leader performed random reviews of the CSO permit files, in comparing data on the completed forms with the data entered in the DCS. Data entry patterns causing errors were brought to the attention of data entry team members' in order to limit propagation of erroneous data into the DCS. Several data base queries were developed to detect illogical responses, data entry errors, and missing data. These queries were applied continuously as new data was entered into the DCS. Summaries of the data stored in the DCS were sent to the state and regional CSO Coordinators for review and correction. Updates to the DCS were made based on state and regional responses, and revised summaries were resent for a final verification. These QA/QC levels helped not only to verify data accuracy, but also to ensure that different state CSO programs were characterized in a consistent manner.

This section focuses on the DCS QA/QC process, which consisted of both automated and manual components.

4.1 DCS Automated Queries

Automated queries for the DCS were developed to provide a level of efficiency in QA/QC that could not be accomplished through manual review. Manual file review could be biased because no two auditors are alike and identical reviews from one data collection form to the next could not be guaranteed. Automated queries would allow global DCS reviews without human review bias or error, and could be performed very quickly, affording more time for the development and application of additional QA/QC queries. Automated queries also provided a means to compare expected responses with actual query results to further screen out impossible or improbable data.

The most basic type of automated query sorted and compared actual data with expected values in order to reveal errors (e.g., "null" (i.e., missing) values - fields for which values were required but none recorded.) The following types of QA/QC steps applied used this methodology:

- Typographic errors for data with specific numeric formats such as phone numbers and outfall latitudinal and longitudinal coordinates were detected and corrected.
- NPDES numbers and permit issuance and expiration dates were screened for formatting errors and then matched against a prior EPA data base of CSO permittees. Results were verified using PCS.
- Current and original outfall counts were compared-when the current number was greater than the original, results were verified using the data collection forms and through contacting the state or regional CSO Coordinator.
- Null values for NMC and LTCP requirements were detected and corrected.
- Any "?", blank, or N/A responses for LTCP and NMC implementation was verified with the data collection form and, if necessary, the permitting authority.

A second type of automated query was developed based on logical response progressions to groups of questions. For example, if "no" was recorded for the requirement to implement the NMC, then there should be no response recorded for a follow-up question. The reverse is also true-if there was a requirement to implement the NMC then there must also be data listed describing implementation. This method was used to filter nonsense or unlikely responses for permittees meeting the following conditions:

- Permittees that were required to implement NMC and complete LTCPs, but data did not indicate how that requirement was executed (permit or enforcement action).
- Permittees that were required to implement the NMC, but did not have accompanying data describing which controls were implemented. This query also helped reveal permittees incorrectly marked as not having a NMC requirement.
- Communities that were not required to develop LTCPs, but were not recorded as having implemented CSO controls outside of an LTCP.
- Permittees that were required to develop an LTCP, but had null values for submittal status.

- Permittees that have submitted LTCPs, but had null values for approval status.
- Communities that were required to develop an LTCP but not implement the NMC.
- Permittees that were defined as being Satellite Collection Systems (SCSs), but listed no facilities where sanitary flow was being treated. This query also helped identify permittees that were incorrectly recorded as being SCS.

It is possible that permittees might meet any of the conditions listed above, however these situations were uncommon enough to warrant confirmation with the data collection form, and if necessary, the NPDES permitting authority.

4.2 DCS Manual Queries

While automated queries provide a reliable method of QA/QC, many tasks were still be performed manually. One example of a data type best verified via a manual assessment is WWTP flow information. For example, there are facilities with 1.0 mgd flow capacities and facilities with 100 mgd capacities. It would be difficult to develop a query that could reliably conclude which of these entries might be a typographic error. It is much simpler to visually compare service population statistics or average daily flow to design treatment capacity in order to uncover inconsistencies. The technique used for these manual queries often started with a computer-based query. Data was further analyzed by referring to the data collection forms and through conversations with state and regional CSO Coordinators. The following types of data were best suited to manual verification:

- WWTP flow data
- CSO control technologies
- LTCP cost estimates
- Service populations
- Estimated annual CSO discharge volume
- Estimated number of annual CSO events

4.3 Data Validation/Verification

The DCS QA/QC process concluded with data validation and verification. Each state was provided with a narrative fact sheet describing the state's permitting, enforcement and water quality standards programs as relative to CSOs. As is evident from the data collection form (see Appendix F-1), more data was collected and input into the DCS (where available) than was utilized. For review purposes, a summary of specific DCS data used in this first CSO Report to Congress was distributed with the fact sheets (see example in Appendix F-2). The data summary contained the facility name, location , NPDES permit number, permit issuance and expiration dates, NMC and LTCP requirements, LTCP submittal and approval details, and outfall counts for each CSO permittee. Comments/corrections received from both the EPA region and the permitting authority were then incorporated into the DCS.

Appendix F-1: Data Collection Forms

PART I: INTERVIEW WITH STATE CSO COORDINATOR

Contact Person:					
Mailing Address:					
Web Site:					
Email Address:					
Telephone Number:					
Fax Number:					
Number of current permits requiring NMCs					
Number of enforceable mechanisms requiring NMCs					
Communities having implemented NMCs	0%	25%	50%	75%	100%
Communities submitting NMC documentation	0%	25%	50%	75%	100%
NMC documentation reviewed/approved by State	0%	25%	50%	75%	100%
Permits requiring LTCP development	0%	25%	50%	75%	100%
Are there any CSO control requirements for communities too small to develop LTCPs?				YES	NO
If yes, communities implementing CSO controls outside LTCP	0%	25%	50%	75%	100%
Number of LTCPs received, to date:					
Number of LTCPs approved, to date:					
For completed LTCPs, is permittee in compliance with WQS?			YES	NO	?
Have WQS staff been involved in LTCP reviews?			YES	NO	?
Has a coordination team of CSO stakeholders been formed?			YES	NO	?
Number of requests for CSO-related water quality standards reviews:					
WQ data collected sufficient to perform a standards review?			YES	NO	?
CSO-related enforcement actions undertaken by the State for failure to implement NMCs:					
CSO-related enforcement actions undertaken by the State for failure to implement LTCPs:					
Where are these enforcement actions documented?					
Estimated dollars spent state-wide on CSO controls					
Estimated needs for additional CSO controls					

NOTES:

PART Ia: INTERVIEW WITH STATE WQS COORDINATOR

Contact Person:			
Mailing Address:			
Web Site:			
Email Address:			
Telephone Number:			
Fax Number:			
Have WQS staff been involved in the LTCP reviews?	YES	NO	?
To your knowledge, have any CSO communities requested WQS reviews as part of the LTCP process?			
	YES	NO	?
If so, have the communities submitted sufficient data to support a WQS review?			
	YES	NO	?
Have any WQS reviews for CSO receiving waters been initiated?	YES	NO	?
Have any communities received variances for CSO discharges?	YES	NO	?
Have any CSO-related WQS revisions been completed?	YES	NO	?
Does the State have a formal process for reviewing WQS for CSO-impacted waters?			
	YES	NO	?
Are all CSO impacted waters on the States list of impaired waters?	YES	NO	?
Are CSO impacted waters given special consideration during your triennial review process?			
	YES	NO	?
Post implementation of LTCPs, will the permit meet WQS?	YES	NO	?

NOTES:

PART Ib: INTERVIEW WITH STATE ENFORCEMENT COORDINATOR

Contact Person:			
Mailing Address:			
Web Site:			
Email Address:			
Telephone Number:			
Fax Number:			
Have enforcement staff been involved in the LTCP reviews?	YES	NO	?
What types of enforcement orders has the State used for CSO compliance?			
Judicial Order **Administrative Order**			
Consent Decree			
How many enforcement orders has the State issued related to NMC implementation?			
Of these, how many were for noncompliance with a permit requirements?			
How many were to keep NMC requirements out of the permit?			
How many enforcement orders has the State issued related to LTCP development?			
Of these, how many were for noncompliance with a permit requirements?			
How many were to keep the requirement to develop an LTCP out of the permit?			
How many enforcement orders has the State issued related to LTCP implementation?			
Of these, how many were for noncompliance with a permit requirements?			
How many were to keep LTCP implementation schedules out of the permit?			
What is the role of the EPA Regional office in enforcement actions in the State?			

NOTES:

Onsite Review __________
Office Review __________
Data Entry __________

PART II: CSO COMMUNITY/FACILITY INFORMATION

A. FACILITY INFORMATION			Source*
Facility Name:	**Abbreviation:**		
Mailing Address:			
Facility Address: (NOT P.O. Box)			
NPDES Permit #:	**County:**		
Iss. Date: ___ / ____ / _________	**Exp. Date:** ___ / ____ / _________	**Effect. Date:** ___ / ____ / _________	
Permittee Type (Circle One):	WWTP and CSOs	CSO outfalls only	
Website:			
Contact Person:			
Title:			
Telephone Number: _____ - _____ - ___________	**FAX:** _____ - _____ - ___________		

B. DEVELOPMENT AND EVALUATION OF ALTERNATIVES				
Requirement to implement nine minimum controls?	YES	NO	?	
IF YES -- THEN COMPLETE: **Being implemented through an ENFORCEABLE mechanism or a PERMIT?**	E	P	?	
Controls Implemented (Check all that apply)				
☐ All 9 required controls have been implemented.				
☐ 1. Proper O&M programs for the sewer system and the CSOs				
☐ 2. Maximum use of the collection system for storage				
☐ 3. Review of pretreatment requirements to minimize CSO impacts				
☐ 4. Maximization of flow to the POTW for treatment				
☐ 5. Prohibition of CSOs during dry weather				
☐ 6. Control of solid and floatable materials in CSOs				
☐ 7. Pollution prevention				
☐ 8. Public notification				
☐ 9. Monitoring				
☐ None of the NMC have been implemented.				
☐ Cannot determine which controls have been implemented.				
NMC Documentation submitted to State?	YES (Date:___ / ___ / _____)	NO	?	

*Use the following codes in the source column: (P) Permit; (A) Permit Application; (L) LTCP; (AR) Annual Report; (O) Other

Onsite Review __________
Office Review __________
Data Entry __________

Requirement to develop LTCP?		YES	NO	?	
IF YES -- THEN COMPLETE	**Being implemented through an ENFORCEABLE mechanism or a PERMIT?**	E	P	?	
	LTCP submitted to the State?	YES (Date:___ / ___ / _____)	NO	?	
	LTCP approved by the State?	YES (Date:___ / ___ / _____)	NO	?	
	LTCP predict compliance with current WQS?	YES	NO	?	
	LTCP implementation initiated?	YES (Date:___ / ___ / _____)	NO	?	
	LTCP implementation completed?	YES (Date:___ / ___ / _____)	NO	?	
	Was a collection systems model developed?	YES	NO	?	
	Were the impacts of the NMCs considered in the LTCP?	YES	NO	?	
	Current treatment (% of vol of combined sewage collected in the CSS captured for treatment): ________				
	LTCP APPROACH (Choose one and complete the appropriate sections)				
	PRESUMPTION	**OR**	**DEMONSTRATIVE**		
	check one to describe approach:		answer each of the following questions:		
	☐ limit # of overflow events per year		Has the permittee collected data for the baseline conditions in the rec waters?	Y N ?	
	☐ capture at least 85% of wet weather combined sewage vol per year		Has the permittee performed rec water modeling?	Y N ?	
	☐ eliminate or reduce mass of pollutants equiv to 85% capture		Has the permittee demonstrated compliance with effluent limitations?	Y N ?	
NO	**Has the community implemented CSO controls outside of a LTCP (e.g., SSES, TMDLs, Watershed Management Plans?)**	YES	NO	?	

NOTES FOR SECTION B -- NMC and LTCP or other Narrative Information on Implementation

*Use the following codes in the source column: (P) Permit; (A) Permit Application; (L) LTCP; (AR) Annual Report; (O) Other

Onsite Review __________
Office Review __________
Data Entry __________

C. SELECTION AND IMPLEMENTATION OF CONTROLS - Please refer to Appendix A, CSO Control Technologies, and list controls according to their reference numbers.			
Source controls (controls to keep storm water or pollutants out of the CSS)	**Date Completed**	**Estimated capital cost**	
	__ / ___ / ______	$	
	__ / ___ / ______	$	
	__ / ___ / ______	$	
	__ / ___ / ______	$	
	__ / ___ / ______	$	
	__ / ___ / ______	$	
In-System controls (controls that require modification of the CSS)	**Date Completed**	**Estimated capital cost**	
	__ / ___ / ______	$	
	__ / ___ / ______	$	
	__ / ___ / ______	$	
	__ / ___ / ______	$	
	__ / ___ / ______	$	
	__ / ___ / ______	$	
Target date for completing LTCP implementation:	__ / ___ / ______		
Capital cost of implementing all controls outlined in LTCP:		$	
NOTES FOR SECTION C -- Controls Solutions/alternatives considered/financial hardships; possible case study elements - use reverse if needed			

D. EFFECTIVENESS OF STRUCTURAL CONTROLS					
Were any pilot tests conducted?		YES	NO	?	
Is pre-construction monitoring data available?		YES	NO	?	
Is post-construction monitoring data available?		YES	NO	?	
Has the permittee documented pollutant removal efficiencies?		YES	NO	?	
Has ambient receiving water data been collected?		YES	NO	?	
IF YES	If yes, what parameters were monitored?	______________________________			
	How frequently was data collected?	______________________________			
	What were the beginning and ending sampling dates?	__ / ___ / ______	__ / ___ / ______		
	Is the data adequate to support a WQS review?	YES	NO	?	

*Use the following codes in the source column: (P) Permit; (A) Permit Application; (L) LTCP; (AR) Annual Report; (O) Other

Onsite Review _________
Office Review _________
Data Entry _________

E. COLLECTION SYSTEM INFORMATION - Provide information on entities served by the WWTP (name, estimated population, and whether the collection system is comprised of combined or separate sanitary sewers. If the entity is comprised of both system types, list each type separately)			
ENTITY	**POPULATION**	**TYPE OF SYSTEM**	
TOTAL POPULATION SERVED:	________________________________		
If permitted for OUTFALLS ONLY (no treatment fac.), list treatment facility and/or town receiving flow: ________________________________			

F. FLOW AND TREATMENT INFORMATION				
Annual average daily flow (MGD otherwise LIST UNITS):	________________________			
Design primary treatment capacity (MGD):	________________________			
Design secondary treatment capacity (MAD):	________________________			
Peak flow primary treatment capacity (MGD):	________________________			
Peak flow secondary treatment capacity (MGD):	________________________			
Other available treatment types (list treatment type and maximum daily flow allowed)**:** ____ ____				
Are CSO-related bypasses authorized?	YES	NO	?	
Are partially treated effluents combined with fully treated flows prior to discharge?	YES	NO	?	

G. DISCHARGES & OTHER DISPOSAL METHODS - This section is ONLY concerned with discharges to waters of the U.S. List how many of each of the following types of discharge points are within the municipal collection system.			
Original number of CSO PERMITTED outfall points:	________		
Current number of CSO PERMITTED outfall points:	________	Date: __ / ___ / ______	
Number of constructed emergency overflows prior to the WWTP (e.g. relief at pump stations):	________		
Average number of dry weather overflows per year:	________		
Number of discharge points with effluent receiving full (secondary) treatment:	________		
Number of discharge points with effluent receiving partial (primary) treatment ONLY:	________		

*Use the following codes in the source column: (P) Permit; (A) Permit Application; (L) LTCP; (AR) Annual Report; (O) Other

Onsite Review __________
Office Review __________
Data Entry __________

H. SYSTEM CHARACTERIZATION					
SYSTEM TYPE		% of Sewer Network	Sewer Length (indicate units)	Acres Served	
Combined Sewer	Original				
	Current				
Separate Sewer	Original				
	Current				
TOTALS (if not broken out - length and acres):					
Are there any CSO discharges to sensitive areas?			YES NO ?		

YES CHK APPLICABLE
- ☐ Outstanding National Resource Waters
- ☐ National Marine Sanctuaries
- ☐ Waters with threatened or endangered species
- ☐ Primary contact recreation waters, such as bathing beaches
- ☐ Public drinking water intakes or their designated protection areas
- ☐ Shellfish beds
- ☐ Other (specify): ____

NOTES FOR SECTION H -- System Characterization
Note information on land-use, area rainfall/precipitation; special information about the area/system

I. RECEIVING WATER DESCRIPTION - Complete this section for each receiving water that receives discharge from either the WWTP or CSO point(s). Try to determine if these bodies are listed on the 303(d) list as impaired waterbodies and why.

Receiving Water Name	Name of Watershed	CSO-related WQS review completed?	
		YES NO ?	
		YES NO ?	
		YES NO ?	
		YES NO ?	
		YES NO ?	

J. WATER QUALITY DATA - Photocopy and attach data collected for wet weather or CSO studies.
- ☐ BOD/CBOD ____
- ☐ TSS ____
- ☐ DO ____
- ☐ Fecal Coliforms ____
- ☐ E. coli ____
- ☐ Enterrococci ____
- ☐ Metals ____
- ☐ Other (specify) ____

*Use the following codes in the source column: (P) Permit; (A) Permit Application; (L) LTCP; (AR) Annual Report; (O) Other

Data Collection Form Appendix A: CSO Control Technologies

Source Controls

1.0	**Pollution Prevention**
1.1	Animal waste removal
1.2	Catch basin cleaning
1.3	Commercial/industrial pollution prevention
1.4	Enforcement of litter laws
1.5	Fertilizer and pesticide management
1.6	Industrial pretreatment
1.7	Public education programs
1.8	Sediment and erosion control
1.9	Snow removal and deicing control
1.10	Solid waste reduction and recycling
1.11	Storm drain stenciling
1.12	Street sweeping/cleaning
1.13	Water conservation

2.0	**Stormwater Inflow Reduction**
2.1	Area drain, foundation drain, and roof leader disconnection
2.2	Basement sump pump redirection
2.3	Flow restrictions and catch basin inlet modification
2.4	Flow slipping
2.5	Grassed swales and infiltration trenches (new construction)
2.6	Infiltration basins (new construction)
2.7	On-street surface storage
2.8	Porous pavements
2.9	Stormwater detention basins
2.10	Stormwater infiltration sumps

In System Controls

3.0	**Floatables Control**
3.1	Baffles (only certain locations)
3.2	Catch basin hoods
3.3	Catch basin trash buckets
3.4	Containment booms and barrier curtains
3.5	Continuous deflective separation systems
3.6	Floating netting units
3.7	In-line netting
3.8	Skimmer vessels
3.9	Screens and trash racks
4.0	**Collection System Optimization and Control**
4.1	Air-regulated siphons
4.2	Bending weirs
4.3	Combined sewer flushing
4.4	Elastomeric tidegates
4.5	Flow diversion
4.6	Flow throttling devices
4.7	Hydroslide™ flow regulator
4.8	Infiltration/inflow control
4.9	Inflatable dams
4.10	Manhole maintenance
4.11	Motor- or hydraulically operated sluice gates
4.12	Polymer injection
4.13	Real-time flow control
4.14	Sewer rehabilitation
4.15	Sewer separation (in limited areas)
4.16	Static flow control
4.17	Submerged catch basin outlets and siphons
4.18	Turbo™ vortex valves
4.19	Variable flow control
4.20	Outfall Elimination
5.0	**Storage (In-Line and Off-Line)**
5.1	Abandoned pipelines
5.2	Catch basin storage tanks
5.3	Earthen basins
5.4	First flush tanks
5.5	In-receiving water flow balance
5.6	In-sewer storage
5.7	Lagoons
5.8	Open concrete retention tanks
5.9	Closed concrete retention tanks
5.10	Storage tunnels and conduits
5.11	Upgraded pump station capacity
5.12	Upgraded WWTP capacity

6.0	**Physical Treatment**
6.1	Abandoned primary facilities (see comment)
6.2	Carbon adsorption
6.3	Carrier-enhanced settling
6.4	Compressed media filters
6.5	Dissolved air flotation
6.6	Fine screens and microstrainers
6.7	Flocculation (w/ chemical treatment for removal at the WWTP)
6.8	Helical bend regulator/concentrator
6.9	High rate filtration
6.10	Primary sedimentation
6.11	Swirl concentrators and vortex separators
7.0	**Biological Treatment**
7.1	Biological aerated filters
7.2	Contact stabilization
7.3	Fluidized bed filtration
7.4	Rotating biological contactors
7.5	Treatment lagoons
7.6	Trickling filtration
8.0	**Chemical Treatment**
8.1	Calcium hypochlorite
8.2	Chlorine gas
8.3	Chlorine dioxide
8.4	Ozone
8.5	Peracetic acid
8.6	Sodium hypochlorite (high rate addition)
8.7	Ultraviolet radiation

Appendix F-2: Examples DCS Summary Report

(for state and regional review and validation of data)

CSO PERMITTEE SUMMARY REPORT ATTACHED

Please review the attached summary of CSO permittees. Make corrections andannotations directly on the report. Limno-Tech, Inc. staff (contractor support) will be contacting you to discuss your questions and changes.

The following is an explanation of the headers/fields in the report (FIELD - DESCRIPTION/NOTES):

1. Status - S (separated), E (eliminated), null/blank (active)
2. NPDES - NPDES Permit Number
3. Facility Name - Facility Name
4. City - Facility City
5. Permit Issue - Permit Issuance Date
6. Permit Exp. - Permit Expiration Date
7. Req for NMC? - Does this facility have a requirement to implement the NMC?
8. Req to Develop LTCP? - Does this facility have a requirement to develop an LTCP as defined in the CSO Control Policy
9. LTCP Permit or Enfor - If LTCP required (8=Yes), is it required in the NPDES permit or some other enforcable mechanism?
10. LTCP -Submitted? - Has the LTCP been submitted?
11. LTCP - State Approv.? - Has the LTCP been approved by the state (or permitting authority)?
12. LTCP - Approach - presumption or demonstration approach
13. CSO Controls Outside LTCP? - Have their been any CSO controls implemented outside of a LTCP (e.g., hydraulic upgrades, separation not through LTCP, pre-Policy CSO planning and control efforts, etc.)
14. Org CSO Outfalls - Original number of CSO outfalls (original or previously documented)
15. Curr CSO Outfalls - Current number of CSO outfalls (as currently permitted)

WA - CSO PERMITTEE SUMMARY **CSO PERMITTEE SUMMARY - WA**

Status	NPDES	Facility Name	City	Permit Issue	Permit Exp	Req for NMC?	Req to Develop LTCP?	LTCP- Permit or Enfor.	LTCP - Submitted?	LTCP - State Approv.?	LTCP - Approach	CSO Controls Outside	Org. CSO Outfalls	Curr CSO Outfalls
	WA0020257	City of Anacortes WWTP	Anacortes	6/30/98	6/30/03	YES	YES	PER	YES	YES	PRESUMPTION			3
	WA0023744	City of Bellingham WWTP	Bellingham	9/15/00	6/30/05	YES	YES	PER	YES	YES	PRESUMPTION			2
	WA0023973	City of Port Angeles WWTP	Port Angeles	11/30/93	6/30/97	YES	YES	PER	YES	YES	PRESUMPTION		7	5
	WA0024074	City of Mt. Vernon WWTP	Mt. Vernon	6/16/93	6/16/98	YES	YES	PER	YES	YES	PRESUMPTION			2
	WA0024473	Spokane WWTP and CSOs	Spokane	3/30/00	3/29/05	YES	YES	PER	YES	YES	PRESUMPTION	YES		24
	WA0024490	Everett WPCF	Everett	10/30/92	5/15/97	YES	YES	PER	YES	YES	PRESUMPTION			18
	WA0029181	West Point STP	Seattle	1/1/96	12/31/00	YES	YES	PER	YES	YES	PRESUMPTION			34
	WA0029289	Bremerton WWTP	Bremerton	6/21/96	6/21/01	YES	YES	PER	YES	YES	PRESUMPTION			16
	WA0029548	Snohomish WWTP	Snohomish	4/14/00	6/30/04	YES	YES	PER	YES	YES	PRESUMPTION			2
	WA0031682	City of Seattle Collection System	Seattle	4/30/98	6/30/02	YES	YES	PER	NO				113	110
	WA0037061	City of Olympia	Olympia	12/11/93	6/30/97	YES	YES	PER	YES	?	PRESUMPTION			3

Appendix G

AMSA and CSO Partnership
CSO Survey Summary

Summary of AMSA and CSO Partnership Surveys

1.0 Purpose of the AMSA and CSO Partnership Surveys

The Association of Metropolitan Sewerage Agencies (AMSA) and the CSO Partnership conducted independent, confidential surveys of their respective CSO community members during Spring 2001 to assess the status of CSO control programs. The survey forms used by AMSA and the CSO Partnership are attached in Appendix G-1. The respondents to these surveys represent regulated entities that own and operate combined sewer systems. AMSA members tend to be large- to medium-sized communities. CSO Partnership members tend to be small- to medium-sized communities.

Twenty-three of the approximately 85 member communities responded to the CSO Partnership survey. Twenty-seven of the estimated 58 AMSA CSO communities participated. While there was some overlap in the questions posed in each survey, the results are, for the most part, survey-specific. Where applicable, EPA combined responses from both surveys and summarized in this appendix. The number of respondents (n) is noted with each survey result.

2.0 Program Implementation Status

The AMSA and CSO Partnership surveys included questions pertaining to implementation status of CSO control programs. Specifically, survey questions addressed the implementation of the CSO Control Policy with respect to the NMC, development and implementation of LTCPs, and reduction of CSOs since 1994.

Seventy percent of respondents to both surveys indicated full implementation of the NMC (n=47). The CSO Partnership also asked its members, "Of the NMC, which was the most effective in reducing CSO volume, frequency and/or duration?" Maximization of flow to the POTW for treatment and proper operation and regular maintenance programs were identified as the most effective NMC. The ranked results from the CSO Partnership survey are shown in Table G-1.

Table G-1: Effectiveness of NMC in reducing CSO volume, frequency, and duration (n=18) (CSO Partnership survey, 2001)

Rank	NMC Description
1	Maximization of flow to the POTW for treatment
2	Proper operation and regular maintenance programs
3	Review and Modify Pretreatment Requirements
3	Elimination of CSOs during dry weather
5	Maximization of storage in the collection system
5	Control of solid and floatable material in CSOs
5	Pollution prevention programs to reduce contaminants in CSOs
8	Public notification
8	Monitoring to characterize CSO impacts and the efficacy of controls

AMSA respondents were also surveyed about the status of LTCPs. Eighty percent of the AMSA respondents had developed an LTCP (n=25). Of those with LTCPs, 48 percent had been approved. An additional AMSA question focused on the choice of LTCP approach. Of the 21 AMSA respondents, 50 percent of the LTCPs were based upon the demonstration approach, 43 percent were based upon the presumption approach, and 19 percent were based on both approaches or were unspecified. The extent to which LTCPs have been implemented among AMSA survey respondents is given in Table G-2.

Table G-2: Status of LTCP Implementation
(AMSA survey, 2001)

Level of LTCP Implementation	Number of Respondents (n=22)
0-25 percent	11
25-50 percent	3
50-75 percent	4
75-100 percent	4

As can be seen in Table G-2, half of the AMSA respondents (n=22) have implemented at least 25 percent of CSO controls outlined in an LTCP.

The CSO Partnership requested data on the implementation of CSO controls in its survey. Specifically, the survey asked, "How does your NPDES authority require implementation of CSO controls?" Of the 22 respondents, 61 percent indicated that implementation of controls was required through a permit, 23 percent were required through an enforceable order, and 16 percent were required via other methods. In addition, the CSO Partnership asked its members about monitoring: if they engage in regular, periodic flow monitoring of the combined sewer system. Fifty-nine percent of CSO Partnership respondents conduct such monitoring (n=22). Furthermore, 45 percent of CSO Partnership respondents indicated that they monitor receiving water quality during wet weather conditions (n=22).

The majority of all survey respondents indicated that they have recognized reductions in CSOs, including dry weather overflows. Seventy-nine percent of respondents to both surveys (n=43) indicated that they had reduced CSOs since 1994. The percent reduction in CSO frequency (n=23) and volume (n=29) submitted by respondents to both surveys is presented in Table G-3.

Table G-3: Percent reduction in CSO frequency and volume
(AMSA sruvey, 2001; CSO Partnership survey, 2001)

Level of Reduction	Reduction in CSO Frequency Number of Respondents (n=23)	Reduction in CSO Volume Number of Respondents (n=29)
0 - 25 percent	7	8
25-50 percent	5	9
50-75 percent	2	3
75-100 percent	9	9

With regard to dry weather overflows, 62 percent of CSO Partnership respondents stated that they had dry weather overflows before 1994 (n=20). A follow-up question found 67 percent of the respondents had reduced dry weather overflows by 75 percent to 100 percent since 1994 (n=9). CSO Partnership members were also asked to quantify the percentage of CSO outfalls that have been totally eliminated. Twenty-two members responded and of these, 41 percent of the respondents indicated that they had eliminated at least 35 percent of CSO outfalls. In total, respondents had eliminated 132 (of a total of 395) CSO outfalls.

3.0 Benefits

The CSO Partnership survey addressed benefits associated with CSO control and abatement measures by requesting its members to identify environmental benefits specifically attributed to the implementation of CSO control measures. The majority of respondents identified some benefits directly attributable to CSO controls (n= 22). Only six of 25 AMSA respondents indicated that full implementation of the LTCP will result in attainment of water quality standards. Benefits identified in the CSO Partnership survey are presented in Table G-4.

Table G-4: Benefits identified as specifically attributable to CSO controls
(CSO Partnership survey, 2001)

Benefit	Percent of respondents (n=22)
Improved aesthetics	83 percent
Improvement in ambient water quality	78 percent
Drinking water source protection	6 percent
Prevention of beach closures	0 percent
Improvement in public health	39 percent
Shellfish bed re-openings	6 percent
Improved recreational use	50 percent
Protection of sensitive areas	56 percent

4.0 Costs and Financing of CSO Control

Costs and financing for CSO control were investigated in both the AMSA and CSO Partnership Surveys. AMSA surveyed its members about how much of capital improvement plan (CIP) budgets are dedicated to LTCP implementation. Fifteen members responded: seven respondents dedicate between 0-25 percent, five respondents dedicate 25-50 percent, and three respondents dedicate more than 50-70 percent of the CIP to the LTCP. None of the 15 respondents dedicate more than 75 percent of the CIP to the LTCP.

The CSO Partnership survey also asked two questions related to capital costs of CSO control. The first was, "What is your estimate of the investment in capital costs that your community has made to date?" The second question was, "What is your estimate of the additional capital costs that is necessary to comply with the CSO Control Policy?" Capital investments made to date and additional investments needs ranged from less that $100,000 to greater than $1 million. A breakdown of the survey results related to capital costs is shown in Table G-5.

Table G-5: Capital costs related to CSO control
(CSO Partnership survey, 2001)

Capital Costs	Investment Made to Date (n=20)	Additional Investment to Comply with CSO Control Policy (n=18)
< $100,000	4	1
$100,000 to $1 million	4	4
$1 million to $10 million	4	8
$10 million to $100 million	7	3
> $100 million	1	2

In addition, the CSO Partnership surveyed its members about operation and maintenance (O&M) costs. The CSO Partnership first requested an estimate by the CSO community of the investment in annual O&M costs that the community has made to date. Ten of the 18 respondents indicated that annual O&M costs to date were less than $100,000. The second question was, "What is your estimate of the additional annual O&M costs that is necessary to comply with the CSO Control Policy?" The O&M cost estimates are given in Table G-6.

Table G-6: O&M costs related to CSO control
(CSO Partnership survey, 2001)

O&M Costs	Annual O&M Costs to Date (n=18)	Additional Annual O&M to Comply with CSO Control Policy (n=15)
< $100,000	10	6
$100,000 to $1 million	7	5
$1 million to $10 million	1	4

Financing was also considered in the CSO Partnership survey. The survey asked how member communities have funded CSO controls to date. Among the 22 respondents, self-financing was the most prevalent form of funding; 82 percent of the respondents use this funding source. Other funding sources include SRF loans (55 percent), state grants (32 percent), federal grants (18 percent), and other funding sources (5 percent).

5.0 Obstacles to Full Attainment of CSO Control

Lastly, the CSO Partnership survey asked respondents to rate factors as obstacles to full attainment of CSO control. Among the 19 respondents, financial resources was recognized as the most important obstacle; data and guidance to support LTCP development were found to be less significant obstacles. The ranked results are presented in Table G-7.

Table G-7: Obstacles to full attainment of CSO control (n=19)
(CSO Partnership survey, 2001)

Rank	Obstacle
1	Financial resources
2	Complexity of water quality standards review process
3- Tie	Other priorities within water programs
3- Tie	Uncertainty about the roles of EPA and State regulatory authorities
5	Sufficient time
6	Data to support LTCP development and implementation
7	Guidance to support LTCP development and implementation

Appendix G-1: AMSA and CSO Partnership Survey Instruments

Action Please By:
May 7, 2001

To: CSO Members
From: National Office
Date: April 18, 2001
Subject: AMSA CSO SURVEY

The U.S. Environmental Protection Agency (EPA) is required to submit by September 2001 a Report to Congress on the progress made in implementing the *National CSO Control Policy*. EPA has requested assistance from AMSA in the form of data on the status of CSO Policy implementation, noteworthy achievements, and impediments to progress. In response to this request, the National Office agreed to conduct a survey of its CSO members. The enclosed *AMSA CSO Survey Form* was developed by the National Office, with input from members of an ad-hoc CSO Working Group. ***Please review and complete the enclosed survey form, and return it to AMSA by Monday, May 7.***

The Report to Congress presents the membership with an opportunity to demonstrate where progress has been made and to highlight areas of particular concern. To the extent possible, AMSA will tabulate data to exhibit status and trends. We appreciate your time and contribution to this effort.

Please use the following instructions as a guide to completing the enclosed form:

1. ***Where to send forms:*** Complete the survey form and return to AMSA c/o Greg Schaner by ***Monday, May 7***. Completed forms can be faxed to 202/833-4657 or emailed to *gschaner@amsa-cleanwater.org*.

2. ***Questions:*** Feel free to call Greg with any questions regarding the survey at 202/296-9836.

3. ***If you have additional information:*** Include narrative explanations wherever you believe that the "yes" or "no" response does not sufficiently explain your situation. Feel free to attach separate sheets, or to add text after the question if you are accessing this form electronically.

4. ***Suggested performance measures:*** AMSA suggested the use of a number of CSO performance measures to track progress in its 1996 report, *Performance Measures for the National CSO Program*. For your reference in answering # 27 on the survey form, the recommended measures are included as an attachment. A web link to a .pdf version of the report has also been added: *http://www.amsa-cleanwater.org/temp/96pmeasures.pdf* You can either click on the link or cut-and-paste into your web browser to access this file.

5. ***Private information:*** Please indicate if there is any specific information relating to your CSO program which you would like to remain private and confidential. Information submitted to EPA on program status, particularly questions # 1 - 8 will be presented cumulatively, and will not identify specific facilities.

Thank you again for your assistance.

ENCLOSURE

AMSA CSO Survey Form

Contact Information

Name: ____________________
Agency: ____________________
Phone/Fax/email: ____________________

Program Status

1.	Have you fully implemented the **Nine Minimum Controls** that were part of EPA's *National CSO Control Policy*, or the equivalent minimum measures required in your state? If you answered "no", please check those measures that have been completed (see below). ☐ Proper operation and regular maintenance programs ☐ Maximum use of the collection system for storage ☐ Modify pretreatment requirements to minimize CSO impacts ☐ Maximization of flow to POTW for treatment ☐ Prohibition of CSOs during dry weather ☐ Control of solid and floatable materials in CSOs ☐ Pollution prevention ☐ Public notification of CSO occurrences and CSO impacts ☐ CSO Monitoring to characterize CSO impacts/controls	☐ Yes	☐ No
2.	If you have not implemented all nine minimum controls, what are the primary reasons? To the extent possible, please highlight cost, affordability, legal, or administrative issues. ____________________ ____________________ ____________________ ____________________		
3.	Have you developed a Long Term Control Plan (LTCP)?	☐ Yes	☐ No
4.	Has your LTCP been approved?	☐ Yes	☐ No
5.	If you answered "no" to # 4, please provide some background on the primary reasons why the LTCP has not yet been approved? ____________________ ____________________ ____________________ ____________________		
6.	Is your LTCP based on EPA's "presumption approach" or "demonstration approach"? ☐ Presumption approach ☐ Demonstration approach ☐ Neither		
7.	To what extent have you implemented your LTCP? ________ %		

8.	What are the primary reasons for not fully implementing your LTCP? To the extent possible, please highlight cost, affordability, legal, or administrative issues. ____ ____ ____ ____		
Cost / Affordability Issues			
9.	What are the estimated capital and O & M costs for your LTCP when fully implemented? What is the estimated capital and O & M costs of your implemented nine minimum controls (NMCs)? LTCP Capital: ____________________ NMC Capital: ____________________ LTCP O & M: ____________________ NMC O & M: ____________________		
10.	What is your estimate of the amount invested to date on implementing the LTCP? What is your estimate of the amount invested to date on your implemented nine minimum controls (NMCs)? LTCP Capital: ____________________ NMC Capital: ____________________ NMC O & M: ____________________ NMC Capital: ____________________		
11.	Over what time period will your investment in the LTCP occur? _____		
12.	What percentage of your capital improvement plan budget (CIP) is dedicated to your LTCP? _____ %		
13.	What is the ratio of your community's current annual median household income to your current average annual sewer service rates (if known)? (**Note**: EPA considers 2% as the cutoff for affordability.) Worsheet for current rates/income: a. Average annual sewer rates = ______ b. Annual medium income = ______ c. "a" ÷ "b" = ______		
14.	What is the ratio of your community's annual median household income to your projected future average annual sewer service rates after full implementation of your LTCP (if known)? Worsheet for rates/income following LTCP implementation: a. Average annual sewer rates = ______ b. Annual medium income = ______ c. "a" ÷ "b" = ______		
15.	If you are funding your LTCP through alternative mechanisms (i.e., other than sewer rates), please describe: ____ ____ ____ ____		
Compliance with State Water Quality Standards			
16.	When your LTCP has been fully implemented, will water quality standards be attained?	☐ Yes	☐ No

17.	If you answered "no" to # 16, will remaining exceedances be attributed to CSOs?	☐ Yes	☐ No
18.	If you answered "no" to # 17, will remaining exceedances be attributed to other sources?	☐ Yes	☐ No
19.	If you answered "yes" to # 18, please specify which sources will cause continued exceedances and their relative contribution if known. ____________________ ____________________		
20.	If you answered "no" to # 17, is your state reviewing and/or revising the applicable water quality standards to account for wet weather conditions?	☐ Yes	☐ No
21.	If you answered "yes" to # 20, please provide brief description of the revised standard or the options being explored? ____________________ ____________________ ____________________ ____________________		
22.	If continuing water quality standards exceedances are expected after implementation of your CSO LTCP, what other programs are under way that will address those problems? ____________________ ____________________ ____________________ ____________________		
Performance Measurement / Monitoring			
23.	Have you reduced CSOs in your system since 1994?	☐ Yes	☐ No
24.	If you answered "yes" to # 23, please specify: Percentage reduction in frequency: ________ Percentage reduction in volume: ________		
25.	If you answered "yes" to #23, please specify which control measures resulted in the greatest reduction? ____________________ ____________________ ____________________ ____________________		
26.	What accomplishments did your CSO control program make prior to 1994? ____________________ ____________________ ____________________ ____________________		

27.	To the extent you have tracked other anecdotal improvements resulting from your CSO control program, please specify below. For reference to suggested performance measures, see the attached January 1996 AMSA document, *Performance Measures for the National CSO Control Program*, or access the document via the web at http://www.amsa-cleanwater.org/temp/96pmeasures.pdf ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____

Please fax the completed form to Greg Schaner by ***Monday, May 7*** at 202/833-4657 or by email (*gschaner@amsa-cleanwater.org*). If you have any questions about the survey form, please feel free to call Greg at 202/296-9836 or contact him by email http://www.csop.com/partnership/survey_april 2001.htm

The CSO Partnership has developed the following confidential survey to obtain information on the status and effectiveness of CSO control efforts nationwide. Please take a moment to complete and return the survey to us as we will use the results to support our grant funding efforts before Congress as well as our CSO control implemenation efforts with U.S. EPA.

Please contact Paul Calamita (804/775-1099) with any questions.

CSO PARTNERSHIP

Combined Sewer Overflow (CSO) Policy Survey

RETURN BY E-MAIL (pcalamita@mcguirewoods.com) OR FAX (804-698-2026)

Please Return By April 30, 2001

Municipal Data

Population ______________________

Total sewer service area (acres) ______________________

Combined sewer service area (acres) ______________________

The Policy

1. How does your NPDES authority require the implementation of CSO controls?

Through permit _______

Enforceable order _______

Other, please describe ____

____

Nine Minimum Controls

2a. When did you first fully implement the Nine Minimum Controls?

(month/year) ______/ _______

2b. Of the Nine Minimum Controls, which was the most effective in reducing CSO volume frequency, duration or pollutant loadings?

2c. In addition to the Nine Minimum Controls, please describe any other types of low-tech, low cost measures you have implemented that have been effective in reducing CSO volume frequency, duration or pollutant loadings?

Dry Weather Overflows

3a. Did you have Dry Weather Overflows before 1994?

Yes ____ No ____

3b. If yes, by what percentage have you reduced Dry Weather Overflows since 1994?

Monitoring

4a. Do you engage in regular, periodic flow monitoring of your Combined Sewer System?

Yes ____ No ____

4b. If yes, what types of monitoring is conducted?

In-system electronic flow meters ____

End-of-pipe electronic flow meters ____

End-of-pipe block testing ____

Ambient receiving water ____

Other, please describe ____

4c. Do you monitor receiving water quality during wet weather conditions?

Yes ____ No ____

Financing CSO Controls

5. How have you funded CSO control measures in your community to date? (Check all that

apply)

Self-financed ____ SRF loans ____

State grant ____ Federal grant ____

Other, please describe ____

____

____

6a. What is your estimate of the investment your community has made to date in CSO control?

Capital costs ________________

Annual O&M ________________

6b. What is your estimate of the additional investment necessary to comply with the CSO Policy?

Capital costs ________________

Annual O&M ________________

Environmental Benefits

7a. Have you reduced CSOs in your system since 1994?

Yes ____ No ____

7b. If yes, what is your estimate of the reduction in frequency, volume, and duration of the CSOs?

Percentage reduction in frequency _________

Percentage reduction in volume _________

Percentage reduction in duration _________

8a. How many CSO outfalls been totally eliminated in your system?

Number of outfalls eliminated ______

Number of outfalls remaining ______

8b. Why did you chose to eliminate these outfalls?

9. What environmental benefits can you specifically attribute to CSO control measures you have

implemented? (Check all that apply)

Protection of sensitive areas____ Prevention of beach closures ______

Improved recreational uses ____ Drinking water source protection ____

Shellfish bed re-openings ____ Improvement in ambient water quality ____

Improvement in public health ____ Improved aesthetics (sight and smell) ____

Other, please describe____

Challenges

10. Please individually rate the following factors as obstacles to your full attainment of CSO controls on a scale of 1 to 5, with 1 being the least problematic and 5 being the greatest challenge:

Guidance to support LTCP development and implementation _______

Data to support LTCP development and implementation _______

Sufficient time _______

Financial resources _______

Complexity of water quality standards review process _______

Other priorities within water programs _______

Uncertainty about roles of EPA and State regulatory agencies_______

Other, please describe____

Please add any other comments you have about CSOs or the Federal CSO Policy of 1994 (e.g., overall strengths of the policy, weaknesses of the policy, etc.).

Appendix H

Forms Used to Guide
Data Collection Effort

Forms Used to Guide Data Collection Effort

PART I: INTERVIEW WITH STATE CSO COORDINATOR

Contact Person:					
Mailing Address:					
Web Site:					
Email Address:					
Telephone Number:					
Fax Number:					
Number of current permits requiring NMCs					
Number of enforceable mechanisms requiring NMCs					
Communities having implemented NMCs	0%	25%	50%	75%	100%
Communities submitting NMC documentation	0%	25%	50%	75%	100%
NMC documentation reviewed/approved by State	0%	25%	50%	75%	100%
Permits requiring LTCP development	0%	25%	50%	75%	100%
Are there any CSO control requirements for communities too small to develop LTCPs?				YES	NO
If yes, communities implementing CSO controls outside LTCP	0%	25%	50%	75%	100%
Number of LTCPs received, to date:					
Number of LTCPs approved, to date:					
For completed LTCPs, is permittee in compliance with WQS?			YES	NO	?
Have WQS staff been involved in LTCP reviews?			YES	NO	?
Has a coordination team of CSO stakeholders been formed?			YES	NO	?
Number of requests for CSO-related water quality standards reviews:					
WQ data collected sufficient to perform a standards review?			YES	NO	?
CSO-related enforcement actions undertaken by the State for failure to implement NMCs:					
CSO-related enforcement actions undertaken by the State for failure to implement LTCPs:					
Where are these enforcement actions documented?					
Estimated dollars spent state-wide on CSO controls					
Estimated needs for additional CSO controls					

NOTES:

PART Ia: INTERVIEW WITH STATE WQS COORDINATOR

Contact Person:			
Mailing Address:			
Web Site:			
Email Address:			
Telephone Number:			
Fax Number:			
Have WQS staff been involved in the LTCP reviews?	YES	NO	?
To your knowledge, have any CSO communities requested WQS reviews as part of the LTCP process?			
	YES	NO	?
If so, have the communities submitted sufficient data to support a WQS review?			
	YES	NO	?
Have any WQS reviews for CSO receiving waters been initiated?	YES	NO	?
Have any communities received variances for CSO discharges?	YES	NO	?
Have any CSO-related WQS revisions been completed?	YES	NO	?
Does the State have a formal process for reviewing WQS for CSO-impacted waters?			
	YES	NO	?
Are all CSO impacted waters on the States list of impaired waters?	YES	NO	?
Are CSO impacted waters given special consideration during your triennial review process?			
	YES	NO	?
Post implementation of LTCPs, will the permit meet WQS?	YES	NO	?

NOTES:

PART Ib: INTERVIEW WITH STATE ENFORCEMENT COORDINATOR

Contact Person:			
Mailing Address:			
Web Site:			
Email Address:			
Telephone Number:			
Fax Number:			
Have enforcement staff been involved in the LTCP reviews?	YES	NO	?
What types of enforcement orders has the State used for CSO compliance?			
Judicial Order **Administrative Order**			
Consent Decree			
How many enforcement orders has the State issued related to NMC implementation?			
Of these, how many were for noncompliance with a permit requirements?			
How many were to keep NMC requirements out of the permit?			
How many enforcement orders has the State issued related to LTCP development?			
Of these, how many were for noncompliance with a permit requirements?			
How many were to keep the requirement to develop an LTCP out of the permit?			
How many enforcement orders has the State issued related to LTCP implementation?			
Of these, how many were for noncompliance with a permit requirements?			
How many were to keep LTCP implementation schedules out of the permit?			
What is the role of the EPA Regional office in enforcement actions in the State?			

NOTES:

ONSITE REVIEW ________
OFFICE REVIEW ________
DATA ENTRY __________

PART II: CSO COMMUNITY/FACILITY INFORMATION

A. FACILITY INFORMATION			Source*
Facility Name:	**Abbreviation:**		
Mailing Address:			
Facility Address: (NOT P.O. Box)			
NPDES Permit #:	**County:**		
Iss. Date: ___ / ____ / _________	**Exp. Date:** ___ / ____ / _________	**Effect. Date:** ___ / ____ / _________	
Permittee Type (Circle One):	WWTP and CSOs	CSO outfalls only	
Website:			
Contact Person:			
Title:			
Telephone Number: _____ - _____ - ___________	**FAX:** _____ - _____ - ___________		

B. DEVELOPMENT AND EVALUATION OF ALTERNATIVES				
Requirement to implement nine minimum controls?	YES	NO	?	
IF YES -- THEN COMPLETE: **Being implemented through an ENFORCEABLE mechanism or a PERMIT?**	E	P	?	
Controls Implemented (Check all that apply)				
☐ All 9 required controls have been implemented.				
☐ 1. Proper O&M programs for the sewer system and the CSOs				
☐ 2. Maximum use of the collection system for storage				
☐ 3. Review of pretreatment requirements to minimize CSO impacts				
☐ 4. Maximization of flow to the POTW for treatment				
☐ 5. Prohibition of CSOs during dry weather				
☐ 6. Control of solid and floatable materials in CSOs				
☐ 7. Pollution prevention				
☐ 8. Public notification				
☐ 9. Monitoring				
☐ None of the NMC have been implemented.				
☐ Cannot determine which controls have been implemented.				
NMC Documentation submitted to State?	YES (Date:___ / ___ / _____)	NO	?	

* Use the following codes in the source column: (P) Permit; (A) Permit Application; (L) LTCP; (AR) Annual Report; (O) Other

ONSITE REVIEW ________
OFFICE REVIEW ________
DATA ENTRY __________

Requirement to develop LTCP?		YES	NO	?	
IF YES -- THEN COMPLETE	**Being implemented through an ENFORCEABLE mechanism or a PERMIT?**	E	P	?	
	LTCP submitted to the State?	YES (Date:___ / ___ / _____)	NO	?	
	LTCP approved by the State?	YES (Date:___ / ___ / _____)	NO	?	
	LTCP predict compliance with current WQS?	YES	NO	?	
	LTCP implementation initiated?	YES (Date:___ / ___ / _____)	NO	?	
	LTCP implementation completed?	YES (Date:___ / ___ / _____)	NO	?	
	Was a collection systems model developed?	YES	NO	?	
	Were the impacts of the NMCs considered in the LTCP?	YES	NO	?	
	Current treatment (% of vol of combined sewage collected in the CSS captured for treatment): ________				
	LTCP APPROACH (Choose one and complete the appropriate sections)				
	PRESUMPTION — check one to describe approach:	**OR**	**DEMONSTRATIVE** — answer each of the following questions:		
	☐ limit # of overflow events per year		Has the permittee collected data for the baseline conditions in the rec waters?	Y N ?	
	☐ capture at least 85% of wet weather combined sewage vol per year		Has the permittee performed rec water modeling?	Y N ?	
	☐ eliminate or reduce mass of pollutants equiv to 85% capture		Has the permittee demonstrated compliance with effluent limitations?	Y N ?	
NO	**Has the community implemented CSO controls outside of a LTCP (e.g., SSES, TMDLs, Watershed Management Plans?)**	YES	NO	?	

NOTES FOR SECTION B -- NMC and LTCP or other Narrative Information on Implementation

* Use the following codes in the source column: (P) Permit; (A) Permit Application; (L) LTCP; (AR) Annual Report; (O) Other

ONSITE REVIEW ________
OFFICE REVIEW ________
DATA ENTRY __________

C. SELECTION AND IMPLEMENTATION OF CONTROLS - Please refer to Appendix A, CSO Control Technologies, and list controls according to their reference numbers.			
Source controls (controls to keep storm water or pollutants out of the CSS)	**Date Completed**	**Estimated capital cost**	
	__ / ___ / _______	$	
	__ / ___ / _______	$	
	__ / ___ / _______	$	
	__ / ___ / _______	$	
	__ / ___ / _______	$	
	__ / ___ / _______	$	
In-System controls (controls that require modification of the CSS)	**Date Completed**	**Estimated capital cost**	
	__ / ___ / _______	$	
	__ / ___ / _______	$	
	__ / ___ / _______	$	
	__ / ___ / _______	$	
	__ / ___ / _______	$	
	__ / ___ / _______	$	
Target date for completing LTCP implementation:	__ / ___ / _______		
Capital cost of implementing all controls outlined in LTCP:		$	

NOTES FOR SECTION C -- Controls

Solutions/alternatives considered/financial hardships; possible case study elements - use reverse if needed

D. EFFECTIVENESS OF STRUCTURAL CONTROLS					
Were any pilot tests conducted?		YES	NO	?	
Is pre-construction monitoring data available?		YES	NO	?	
Is post-construction monitoring data available?		YES	NO	?	
Has the permittee documented pollutant removal efficiencies?		YES	NO	?	
Has ambient receiving water data been collected?		YES	NO	?	
IF YES	If yes, what parameters were monitored?	______________________________			
IF YES	How frequently was data collected?	______________________________			
IF YES	What were the beginning and ending sampling dates?	__ / ___ / _______	__ / ___ / _______		
IF YES	Is the data adequate to support a WQS review?	YES	NO	?	

* Use the following codes in the source column: (P) Permit; (A) Permit Application; (L) LTCP; (AR) Annual Report; (O) Other

ONSITE REVIEW ________
OFFICE REVIEW ________
DATA ENTRY __________

E. COLLECTION SYSTEM INFORMATION - Provide information on entities served by the WWTP (name, estimated population, and whether the collection system is comprised of combined or separate sanitary sewers. If the entity is comprised of both system types, li

ENTITY	POPULATION	TYPE OF SYSTEM	
TOTAL POPULATION SERVED:	______________________________		
If permitted for OUTFALLS ONLY (no treatment fac.), list treatment facility and/or town receiving flow: ______________________________			

F. FLOW AND TREATMENT INFORMATION

Annual average daily flow (MGD otherwise LIST UNITS):	____________________				
Design primary treatment capacity (MGD):	____________________				
Design secondary treatment capacity (MAD):	____________________				
Peak flow primary treatment capacity (MGD):	____________________				
Peak flow secondary treatment capacity (MGD):	____________________				
Other available treatment types (list treatment type and maximum daily flow allowed)**:** ______________________________ ______________________________					
Are CSO-related bypasses authorized?		YES	NO	?	
Are partially treated effluents combined with fully treated flows prior to discharge?		YES	NO	?	

G. DISCHARGES & OTHER DISPOSAL METHODS - This section is ONLY concerned with discharges to waters of the U.S. List how many of each of the following types of discharge points are within the municipal collection system.

Original number of CSO PERMITTED outfall points:	________		
Current number of CSO PERMITTED outfall points:	________	Date: __ / ___ / ______	
Number of constructed emergency overflows prior to the WWTP (e.g. relief at pump stations):	________		
Average number of dry weather overflows per year:	________		
Number of discharge points with effluent receiving full (secondary) treatment:	________		
Number of discharge points with effluent receiving partial (primary) treatment ONLY:	________		

* Use the following codes in the source column: (P) Permit; (A) Permit Application; (L) LTCP; (AR) Annual Report; (O) Other

ONSITE REVIEW ________
OFFICE REVIEW ________
DATA ENTRY ________

H. SYSTEM CHARACTERIZATION

SYSTEM TYPE		% of Sewer Network	Sewer Length (indicate units)	Acres Served	
Combined Sewer	Original				
	Current				
Separate Sewer	Original				
	Current				
TOTALS (if not broken out - length and acres):					

Are there any CSO discharges to sensitive areas? YES NO ?

YES CHK APPLICABLE

- ☐ Outstanding National Resource Waters
- ☐ National Marine Sanctuaries
- ☐ Waters with threatened or endangered species
- ☐ Primary contact recreation waters, such as bathing beaches
- ☐ Public drinking water intakes or their designated protection areas
- ☐ Shellfish beds
- ☐ Other (specify): ____

NOTES FOR SECTION H -- System Characterization
Note information on land-use, area rainfall/precipitation; special information about the area/system

I. RECEIVING WATER DESCRIPTION

- Complete this section for each receiving water that receives discharge from either the WWTP or CSO point(s). Try to determine if these bodies are listed on the 303(d) list as impaired waterbodies and why.

Receiving Water Name	Name of Watershed	CSO-related WQS review completed?	
		YES NO ?	
		YES NO ?	
		YES NO ?	
		YES NO ?	
		YES NO ?	

J. WATER QUALITY DATA - Photocopy and attach data collected for wet weather or CSO studies.

- ☐ BOD/CBOD ____
- ☐ TSS ____
- ☐ DO ____
- ☐ Fecal Coliforms ____
- ☐ E. coli ____
- ☐ Enterrococci ____
- ☐ Metals ____
- ☐ Other (specify) ____

* Use the following codes in the source column: (P) Permit; (A) Permit Application; (L) LTCP; (AR) Annual Report; (O) Other

Appendix I

Stakeholder Meeting Summary
July 12-13, 2001
Chicago, Illinois

Summary of EPA Stakeholder Meeting, Chicago, Illinois July 12-13, 2001

Introduction

On July 12-13, 2001, the U.S. EPA Office of Water held a meeting in Chicago at the Palmer House Hilton Hotel to discuss the upcoming Report to Congress on Combined Sewer Overflows (CSOs). The meeting provided an invaluable opportunity for the Agency to hear directly from the most experienced CSO stakeholders from across the country about the state of CSO Policy implementation. It also was an opportunity for participants to discuss the initial findings of the draft Report to Congress that will be completed in September 2001.

The main goals of the meeting were to:

- Present and discuss the data, report methodology, and analysis of the Report to Congress.
- Discuss the implications of the major findings of the Report.
- Discuss participants' experiences under the CSO Policy.
- Discuss future directions, including activities related to the Wet Weather Quality Act of 2000.

Appendix I-1 includes a list of attendees from the meeting, and the Agenda is included as Appendix I-2. This summary below recaps the presentations that were given that outline the contents of the report and the resulting discussions. This summary is organized into the following major sections:

- Opening Remarks
- CSO Policy Overview
- Module 1: Methodology
- Module 2: CSO Policy Activities by EPA
- Module 3: Describing CSOs and CSO Communities
- Module 4: National Pollutant Discharge Elimination System (NPDES) Authorities and Other State Programs
- Module 5: CSO Activities by Permittees
- Summary of Day 1
- Opening Remarks for Day 2
- Preliminary Findings Discussion
- Additional Findings Suggested by Participants
- Additional Comments from Stakeholders
- Closing Remarks

Opening Remarks by Tom McSwiggin, Illinois Environmental Protection Agency

Tom McSwiggin, Director of Permits for the Illinois Environmental Protection Agency opened the meeting by welcoming participants to Chicago and providing background on CSO activities in the Chicago area during the past 30 years. From the 1970s until today, Chicago has spent more than $5 billion on CSO control. Mr. McSwiggin explained that development and other land use projects resulted in a decision by the city to reverse the flow of the Chicago River, and that this reversal exacerbated flooding in the city and made CSOs a more important and visible problem. In 1972, Chicago required that all dry weather overflows and first flush have primary treatment and disinfection, and all other flows must have solids removal. In implementing this requirement, the city realized that wet weather overflows were a bigger problem than originally thought, and that their handling would require looking at sewer redesign, expansion and treatment capacity. Mr. McSwiggin stressed that an important issue in moving forward was the philosophy that the costs of treatment should be weighed against environmental benefits.

Mr. McSwiggin noted that since the early 1970s, there have been success stories related to Chicago's CSO program. Although Chicago has not implemented all aspects of the CSO Policy, Mr. McSwiggin believes the Chicago area is fulfilling all federal requirements for CSO controls. Since Chicago began so early, Mr. McSwiggin felt that when the CSO Control Policy was released in 1994, they were already ahead of the curve. Mr. McSwiggin stated that, as with many cities, some think that the city has made significant achievement, while others feel that current controls have not gone far enough.

CSO Policy Overview—Jeff Lape, Acting Director, Water Permits Division, Office of Wastewater Management, U.S. EPA Headquarters

Mr. Lape thanked the participants for coming and explained that the main goals of the meeting were to:

(1) Share with participants what the research on the status of CSO control has yielded so far and what story it might tell (day 1).

(2) Discuss the implications of this information (day 2).

(3) Solicit comments on the CSO program (day 2).

Mr. Lape explained that the nation's sewers were built largely between the 1850s and 1950s for the purpose of transporting waste away from human population centers. This original infrastructure has a single set of pipes in which stormwater and sewage are combined and designed to overflow when capacity is exceeded during storm events.

He discussed the history of CSO controls at EPA and the development of the 1994 CSO Control Policy. In 1989, EPA released the National CSO Strategy. At that time, EPA felt that CSOs needed to be addressed as point sources, but the question of what control would be enough was unanswered. In order to address that question, EPA sought advice from experienced stakeholders, municipalities, states, associations, and environmental groups through a Management Advisory Group (MAG) created in 1992. A subset of the MAG developed a recommendations paper called the Consolidated CSO Framework that formed the basis for the 1994 CSO Control Policy. He reminded the participants that, at the time, the CSO Control Policy was endorsed by all members of the MAG as a thoughtful and progressive policy. The MAG included representatives from the following organizations:

- American Public Works Association
- Association of Metropolitan Sewerage Agencies (AMSA)
- Association of State and Interstate Water Pollution Control Administrators (ASIWPCA)
- Center for Marine Conservation
- CSO Partnership
- Environmental Defense Fund
- Lower James River Association
- National Association of Flood and Stormwater Management Agencies
- National League of Cities
- Natural Resources Defense Council
- Sewage Treatment Out of the Park
- Southern Environmental Law Center
- Water Environment Federation

When the CSO Control Policy was released, EPA and some stakeholders (most prominently Senator Max Baucus) recommended that Congress endorse this Policy. In December 2000, Congress passed an appropriations bill that makes the CSO Control Policy mandatory.

Key principles of the CSO Control Policy that set it up for success are the following:

- Establishes clear levels of control for achieving water quality requirements.
- Provides sufficient flexibility (especially financial) to municipalities.
- Allows for a phased approach to implementation.
- Calls for the review and revision (as necessary) of water quality standards.

Key elements of the Policy include:

- Nine Minimum Controls (NMC)
- Long-Term Control Plans (LTCPs)
- Coordination with review and revision of water quality standards
- Implementation
- Monitoring

Mr. Lape explained that in Phase I of CSO implementation, the NPDES permit should include implementation of the NMC and development and submittal of an LTCP. Municipalities should also prepare a report documenting implementation of the NMC within two years and comply with the water quality standards by the state's due date. Phase II NPDES permits should contain:

- Requirements to implement technology-based controls.
- Narrative requirements for CSO controls.
- Water quality-based effluent limits under Section 122.44(d)(1).
- Compliance with the state's Water Quality Standards numeric performance standards.
- A reopener clause for failures.
- Implementation assessment and monitoring to assess effectiveness.
- Assessment of overflows to sensitive areas.
- Requirements for maximizing treatment for wet weather.

Mr. Lape characterized the CSO Control Policy as a unique approach to a challenging problem. First, the Policy was designed to have stakeholder input from the beginning. Secondly, it describes a process rather than a level of control. This process was designed to maximize environmental benefits while considering affordability. While the CSO Control Policy is process-based, it provides a clear framework for deciding on a level of control that will comply with the Clean Water Act.

The Wet Weather Water Quality Act (WWWQA) of December 2000 amended the Clean Water Act. The WWWQA called for this Report to Congress, due September 1, 2001 (focused on implementation and enforcement), and a second Report to Congress (focused on environmental water quality impacts), due in 2003. The WWWQA also effectively made the CSO Control Policy mandatory. Finally, the WWWQA sets a completion date of July 31, 2001, for guidance on water quality standards as related to LTCP development. This guidance is one that EPA has been working on for several years but has only recently completed for Office of Management and Budget (OMB) review. It will reinforce the notion of coordination and ensure that the data will support the review of water quality standards.

The 2001 Report to Congress will be primarily descriptive and focus on answering following questions:

- What activities has EPA undertaken to implement provisions of the CSO Control Policy?
- What activities have states/NPDES authorities undertaken to control CSOs?
- What approaches have communities undertaken to control CSOs?
- What controls and CSO abatement measures have been successful?
- How successful has the CSO Control Policy been in controlling and abating CSOs?

Although the new Administration's appointees have yet to be confirmed, Mr. Lape gave participants some sense of what major areas of emphasis the current Office of Water leaders have identified:

(1) Watersheds—identify problems "on-the-ground" and tailor solutions (Mr. Lape called participants' attention to a new book called Regulatory Craft by Malcolm Sparrow, which many managers in EPA were reading and using to think about a new paradigm for improving the functioning of regulatory agencies)

(2) Infrastructure improvements

(3) Sound data and information

(4) Performance measures/outcomes

(5) Brownfields

(6) Invasive/nuisance species

Mr. Lape then pointed out that a copy of the strategic plan for NPDES permits was included in the meeting materials if participants wanted additional detail.

Mr. Lape introduced members of his staff and personnel from the Regions that were present: Beverly Bannister (EPA, Region 4 Water Management Division Director), Linda Murphy (EPA, Region 1 Water Management Division Director), Pat Bradley and Tim Dwyer (program managers in charge of the Report to Congress), and Kevin DeBell.

Mr. Lape said he hoped that participants at this meeting could assist EPA in validating its current findings, discuss the implications of these findings, provide insight regarding CSO implementation, discuss directions for the CSO Policy, and provide suggestions on methodology for the next report. He told the group that a summary of the discussion at this meeting would be created, shared with the group, and included as an appendix to the report. In addition, he explained that he was confident that this dialogue would be helpful to EPA in honing the report.

Module 1: Methodology—Kevin DeBell, U.S. EPA Headquarters, Office of Water

Mr. DeBell explained that EPA is preparing the report in response to the charge from Congress to review and report on the implementation and enforcement of the CSO Control Policy. He explained that until last December the Policy was not mandatory, which meant that there was likely to be a variety of interpretations of what the Policy intended and various levels of adoption. As a result of that variety, EPA decided to try to collect primary and secondary information from federal, state, and local data sources rather than rely on a projection of the whole based on partial data.

EPA also based this Report to Congress on information gathered from existing sources, rather than modeling results. These are also recognized as imperfect sources because recording of CSO activities varies widely among implementors. This Report to Congress is the first comprehensive look at the implementation of the CSO Policy. The steps used to collect information for the report included:

- Culling information from existing national programmatic databases (SRF; 104(b)(3); PCS; etc.) and headquarters programmatic files.
- Conducting state visits and reviewed 790 permit, inspection, and enforcement files.
- Interviewing NPDES and water quality standards authorities.
- Developing a state profile for each CSO state describing CSO implementation activities.
- Supplementing programmatic data with 15 to 20 municipal case studies. These municipal case studies will serve to illustrate a cross section of implementation activities and help Congress understand important challenges and successes in CSO control.
- Identifying and documented data gaps.
- Supplementing programmatic data with modeling results.
- Performing a comprehensive literature search.

This report will not address the costs of implementation and the associated environmental benefits in a comprehensive manner. That information has been called for in the 2003 Report to Congress.

Independent information generated by CSO stakeholders will be used to verify or contrast data collected by EPA. It will not be included as independent data. Sources included in the Report to Congress are:

- Natural Resources Defense Council Testing the Waters Report
- Water Environment Federation Water Quality Standards Experts' Conference
- Association of Metropolitan Sewerage Agencies Case Studies and Survey of Members
- Association of Metropolitan Sewerage Agencies Performance Measures Report
- CSO Partnership Survey
- Center for Marine Conservation information

Question: Did EPA consider the Inspector General's (IG's) Report?

Response: EPA has looked at the report and meets regularly with the IG. EPA does not intend to fold data from the IG's report into this report but will use some of the case study information. The IG's report was fairly restrictive in that it focused on only three of the NMC.

Suggestion: Include the information from the New York case study because several critical issues regarding CSO control are highlighted, namely the difficulty of siting CSO outfalls on public land (need an act of the legislature).

Question: What type of data will be culled from the stakeholder sources?

Response: The stakeholder information will be used across the results from the analysis of primary EPA, state, and municipal sources.

Suggestion: Include information from the Natural Resources Defense Council Testing the Waters report, which includes reasons cited for beach closings and documentation of environmental impacts. The next update of the annual report is due in August.

Question: Did EPA look at the 303(d) list?

Response: Yes. That list, along with the 305(b) list, was included in the EPA data.

Module 2: CSO Policy Activities by EPA—Ross Brennan, U.S. EPA Headquarters, Office of Water

Mr. Brennan began his presentation by explaining that after the release of the CSO Control Policy in 1994, everyone had high hopes. EPA poured a lot of resources into implementation of the Policy, which continues today. The challenge that EPA faces is moving forward with the most effective mix of activities. Because the CSO Policy was not a regulation, EPA spent considerable effort clarifying and interpreting what the Policy meant, including the following memoranda:

- CSO Deadline Memorandum (1997)—reiterated the deadline for LTCPs
- CSO Implementation Memorandum (mid-1988)—explained who is out there and what they are doing
- Water Quality-based and Technology-based CSO Requirements Memorandum

In addition, EPA developed a Compliance and Enforcement Strategy for CSOs and SSOs that stated the Agency was following a strong enforcement stance for both of these issues. The Agency was also holding itself accountable by including performance measures for CSOs under the Government Performance and Results Act (GPRA) measures.

In addition to the clarification of the Policy, EPA developed seven separate permitting guidance documents that addressed implementation of NMC, development of LTCPs, permitting, monitoring and modeling, funding, and schedule development. An eighth guidance on the integration of LTCPs and water quality standards was never completed, but is now being finalized to meet Congress' July 31, 2001, deadline.

Mr. Brennan pointed out that the two components of successful CSO implementation involve permitting and enforcement. These two components are interrelated. To help ensure that CSOs are incorporated into the NPDES program, EPA has conducted many permit writing training courses. In addition, it has developed fact sheets on technologies to help inform permit writers and the regulated communities about the latest technology. The Agency also has developed Memoranda of Agreements with Regions that outline enforcement plans.

Mr. Brennan emphasized the importance of communication and coordination in carrying out the CSO program. He noted that stakeholders have been involved heavily in the process. EPA holds frequent conference calls with the CSO coordinators in the 32 states implementing programs, and they have held listening sessions that have involved a wider array of stakeholders.

Mr. Brennan noted that the Agency uses a number of tools to solicit and maintain the volume of information being tracked about the CSO program, including the Local Government Environmental Assistance Network (LGEAN), which helps with information distribution to local governments; the EPA Needs Survey, which helps to identify the cost of controls; the Permit Compliance System database, which helps to identify the universe of facilities; and the water quality inventory, which can help to identify impaired water bodies.

Finally, Mr. Brennan reviewed the status of financial assistance efforts to date for CSO projects. He highlighted that in 2000, over $400 million was made available for CSO projects through the State Revolving Fund (SRF). Since 1994, six entities have been issued cooperative agreements under CWA Section 104(b)(3) for innovative CSO projects. Although the Agency is aware that some money provided to states under Section 106 Water Pollution Program Support Grants is used for CSO activities, grants are not program specific and states are not required to report on how the grant was used, so no specific funding information is available.

At the end of his presentation, Mr. Brennan acknowledged that it is still a challenge to move forward in an environment of limited funding and a need to achieve water quality standards. He observed that EPA now better understands the challenges faced by regulated entities than in the early 1990s, when the Policy was developed.

Question: Has anyone revised their water quality standards?

Response: Some states have moved ahead in this arena, such as Massachusetts and Indiana, but lack of movement is an issue overall.

Comment: NPDES permitting process provides an inadequate vehicle for public participation. Since so many lawsuits are being filed against permits, the public participation activities have focused largely on preparing for litigation.

Comment: EPA has much guidance, but leadership is lacking. Leaving water quality standards revision to the states and municipalities is a political nightmare. The costs are high to implement controls, yet few politicians want to look "ungreen." This is an arena where federal leadership is needed.

Comment: EPA should intervene and take over the programs where necessary when permit backlogs are a big issue.

Comments: Some participants expressed that some stakeholders were making it difficult to revise water quality standards downward and that was a problem. Others felt that there was a need to address water quality standards, but not necessarily revise them downward.

Question: What is the nature of the enforcement actions?

Response: The Agency is still collecting these numbers, but initial estimates are that EPA has taken approximately 20 civil judicial actions and 23 administrative actions and the states have taken about 110 administrative actions. EPA also acknowledged that current systems, including PCS, are incomplete, inaccurate, and obsolete.

Module 3: Describing CSOs and CSO Communities—Ross Brennan, U.S. EPA Headquarters, Office of Water

Mr. Brennan explained that this section of the report attempts to summarize the current CSO universe. The summary data are as follows:

- There are CSOs in nine of the 10 EPA Regions (none in Region 6).
- There are CSOs in 32 states, concentrated in the Northeast and Midwest. Many of these are along river valleys, which reinforces the need for a watershed approach.
- There are 860 permits that include CSOs (some municipalities have multiple permits and some permits cover multiple municipalities).
- There are 9,520 CSO outfalls.
- Four states (Illinois, Ohio, Indiana, Pennsylvania) have over 50 percent of the CSOs nationally.
- Ten states comprise 85 percent of the CSO universe.
- Fourteen states have fewer than 10 CSOs each.
- Nineteen states have no CSOs.

Further detail about the distribution of the permits is as follows:

- Of the 860 permits, 670 of these permits are with POTWs.
- 70-percent of the permits are with majors (more than 1.0 mgd or greater than 10,000 population).
- There are 193 with satellite collection systems.
- 40 of the 860 are unknown.

Question: What was the cause for the decrease in the numbers of CSSs from 1976, when there were thought to be 1,300 CSSs, to 860 now?

Discussion from EPA and participants: There could be several causes for the change in the number. One explanation is that a percentage of these communities have separated their sewers. Another explanation is that the definition being used in 1976 is not the same is it is now, meaning that many communities with separate sewer systems with storm drains are not called CSSs now, but may have been counted previously. Another possible explanation is that the satellite systems may be counted differently. EPA also explained that this is really the first time that they feel they have a good handle on the number of CSSs. The original number of between 1,300 and 1,400 was based on the Needs Survey, which had a discrepancy when compared to the CSO coordinator information. Participants suggested that EPA explain carefully the definition currently being used and possible explanations for the dramatic change in number. EPA should take credit for improvements where appropriate, including systems that have been separated, and then explain the remaining gaps where possible.

Question: Are you using the same definition of satellite systems as used in the SSO discussion?

Response: Yes.

Comment: Tell Congress that, while there are 860 permits, this represents many more political jurisdictions.

Comment: The definition of CSO should be clarified from an enforcement perspective and the new SSO rules; communities would rather fall under the more flexible CSO umbrella.

Question: Is the old estimate of cost for CSO controls $43 million?

Response: Yes.

Question: How was the 70/30 major versus minor split determined?

Response: Major or minor is not always population or flow based. Many of these communities are under 10,000, but we used the major/minor field in PCS.

Module 4: NPDES Authorities and Other State Programs—Pat Bradley, U.S. EPA Headquarters, Office of Water

Mr. Bradley began his presentation by explaining that states and NPDES authorities have two major roles: (1) issuing permits and (2) taking enforcement actions and providing compliance assistance. State water quality authorities are responsible for assisting in conducting water quality standards reviews and revisions. These staff do not often closely coordinate their efforts. Indiana, Massachusetts, and Maine have formal processes for establishing water quality standards, and at least one state has announced that they will not do reviews or revisions.

Currently, 28 of the 32 states are NPDES authorized. Alaska, the District of Columbia, Massachusetts, and New Hampshire have their respective EPA Regional offices as their NPDES authority.

The 1989 CSO Control Strategy (precursor to the 1994 Policy) called for the elimination of dry weather overflows (DWOs), minimizing the impacts of CSOs through the adoption of the six minimum measures and development of a CSO control strategy (or certification of no CSOs) by 1990. A majority of the states met the 1990 deadline for development of a control strategy. All but one developed a strategy by 1991.

States took one of four major approaches to control CSOs. They are as follows:

(1) Revised existing state strategy to match federal CSO Control Policy (CT, GA, IN, KY, ME, MD, MA, NH, OH, WV).

(2) Continued using existing state strategy (IL, IA, MI, MO, VT).

(3) Adopted state requirements either beyond (more stringent than) or outside (aside from) the federal CSO Control Policy; such as:

- New Jersey—watershed approach
- New York—15 best management practices (BMPs)
- Pennsylvania—requires system characterization and water quality reports
- Washington—limits to one overflow per year.

(4) Developed CSO control programs on a site-specific or community-by-community basis (AK, CA, DE, DC, KS, MN, NB, OR, RI, SD, TN, VA, WI; this approach was generally taken by states with less than 4 or 5 CSSs).

Data on Implementation of the NMC:

- Requirements for the NMC were included in 87 percent of permits.
- NMC were adopted by 22 of the 32 states.
- Four states continue to require the Six Minimum Controls (1989 CSO Strategy).
- Two states developed BMPs that exceed requirements of the CSO Policy.
- Four states do not do not require implementation of the NMC.

Data on Implementation of LTCP:

- LTCP development is required with 64 percent of permits.
- Twenty-five states established framework for long-term control planning to meet water quality standards.

- Less than half of the 25 states have enforceable requirements for all CSO permittees to develop LTCPs, due to different priorities, permit backlog issues, and cost.
- Seven states do not require LTCPs.

Mr. Bradley explained that states have two primary financial obligations: (1) funding the state's CSO program and (2) assisting permittees in securing funds necessary for CSO controls. The following statistics are from the State Revolving Fund (SRF):

- 1988 – 1994, $700 million spent on CSO controls.
- 1994 – 2000, $1.3 billion spent on CSO controls.
- Illinois, Michigan, and New York spend the most SRF monies on CSO projects.
- 17 states have additional state financial assistance of some kind (loans, bonds, grants).

Question: How much of this problem of permits not having NMC and LTCPs is due to a permit backlog issue?

Response: About 34 of the 112 permits that do not require the NMC are a result of backlog issues.

Comment: Some states have asked for NMC reports as part of the permit process, but they do not show up in the permit themselves. The compliance may be higher than is indicated by these numbers.

Question: What does enforcement mean given the "shall conform" language of the WWWQA?

Response: Now that the law has changed, and depending on how you interpret "shall conform," states that are issuing permits (after December 2000) that do not include NMC and LTCPs could be inconsistent with the law and vulnerable to legal challenge.

Question: Since 1994, we have had a non-binding policy and states and communities have chosen a variety of approaches to respond to the Policy. How do we reconcile that with the fact that the Policy is now law?

Comment: EPA should require that all communities do the NMC. If some want to do more, that is OK, but at a minimum you must do the NMC. The thrust of the report should be that we have a policy, not much has been done and we need to get moving on it.

Comment: The report should convey the other challenges that states face, such as competing water programs [i.e., storm water, concentrated animal feedlots (CAFOs)]. CSOs have suffered because the CSO Control Policy was not a regulation.

Comment: Before the Policy, many states were doing nothing. These results actually show tremendous progress. Communities deserve a lot of credit for the progress that has been made in CSO controls, particularly since communities are challenged with old infrastructure. Flexibility has helped, but much more funding in the form of grants is needed. Please show financial burden on states of CSO control in the Report to Congress. The communities have the financial data. Without federal assistance, rate payers are being stressed.

Response: EPA said they would address financial burden and related environmental benefits in the 2003 report.

Comment: Several stakeholders stressed that the SRF monies are not a complete solution to CSO controls. Some states add points to these loan dollars, in some cases making them less desirable than private loans. Others reminded EPA that these are loans, and some communities, especially small ones, really need grants to be able to do the work they need to do to comply with the Policy. Simply pouring more money into the SRF will not help everyone.

Module 5: CSO Activities by Permittees—Pat Bradley, U.S. EPA Headquarters, Office of Water

Mr. Bradley explained that EPA estimates that there are 860 CSO permits that cover 777 communities located in 32 different states. Of 860 permits, 765 had data available on the type of receiving water body as summarized below:

- Streams (38 percent)
- Rivers (43 percent)
- Ponds/lakes (2 percent)
- Oceans/estuaries/bays (5 percent)
- Other (12 percent)

The following data were shared with the group on CSO control priorities:

- 301 of the 765 permit files reviewed had information about dry weather overflows; of these 301, 278 permittees noted no dry weather overflows.
- 452 of the 765 permit files reviewed had information on the miles of sewer maintained or acres served.
- 255 of the 765 permit files reviewed have documented the frequency of CSO events, by outfall, for one or more years.
- 195 of the 765 permit files reviewed document annual CSO discharge volumes by outfall, for one or more years.
- 47 of the 765 permit files reviewed have received water monitoring data.

Implementation of the NMC varied greatly. Below are data on the percentage of permits that had documentation on the various types of NMC implemented:

1. Proper operation and maintenance (O&M)—75 percent
2. Maximize use of collection system for storage—75 percent
3. Pretreatment program review and modification—68 percent
4. Maximize flow to the POTW—74 percent
5. Eliminate dry weather overflows—76 percent
6. Floatables control—62 percent
7. Pollution prevention—59 percent
8. Public notification—59 percent
9. Monitoring—56 percent

The following is a list compiled of the most common activities employed to implement the NMC.

NMC Activity	NMC	Number of Permits
Street cleaning	6	182
Catch basin cleaning	6	159
Public education	8	102
Sewer flushing	1	91
Screens and trash racks	6	84
In-sewer storage	2	76
Solid waste reduction and recycling	7	68
Infiltration and inflow control	2	67
Industrial pretreatment	3	61
Area drain, foundation drain and roof leader disconnection	3	58

Implementation of LTCPs:

- 282 of the 786 permits have submitted LTCPs.
  - 28 percent followed the demonstration approach.
  - 36 percent followed the presumption approach.
  - 36 percent followed a combination of demonstration and presumption or different approach altogether.
- 180 of the 282 LTCPs submitted have been approved.
- 232 of the 786 have submitted documentation for project-specific CSO controls that do not meet all the requirements for an LTCP, but go beyond minimal capital investment expectations of the NMC.

The following is a list compiled of the most common activities employed to implement LTCPs.

LTCP Control	CSO Control Category	Number of Permits
Sewer separation	Collection system	223
Sewer rehabilitation	Collection system	72
Retention basins	Storage	71
Primary sedimentation	Storage	69
Disinfection	Treatment	67
Storage tunnels and conduits	Storage	66
Upgraded wastewater treatment plant capacity	Treatment	64
Outfall elimination	Collection system	62
Upgraded pump station capacity	Collection system	53
Swirl concentrators and vortex separator	Treatment	31

Of the 786 permit files, 254 contained information on sensitive areas. Primary contact recreation waters was by far the most often cited type of sensitive use cited by communities. Some states, such as Indiana, have categorized all of their waters as primary contact recreation waters. The following is the breakdown of reported sensitive areas where CSOs are located or are impacting sensitive areas.

- Waters with threatened or endangered species—9
- Shellfish beds— 8
- Public drinking water intake—10
- Primary contact recreation waters—179
- Outstanding National Resource Waters—1
- Other/unspecified—47

According to the CSO Partnership, the large majority of CSO program improvements are self funded (82 percent). Fifty-five of the projects employ the SRF. Thirty-two percent utilize state grants, 18 percent federal grants, and five percent other sources.

Question: Does the definition of oceans/estuaries/bays match the definition in the Beaches Act? If so, five percent seems low since a major impetus pushing CSO control in the early 1990s were the concern over coastal impacts. Perhaps focusing on this five percent would give us the biggest bang for the buck.

Response: These categories were based on what the permit language said, not any standard definition. It is possible that more are oceans/estuaries/bays if the Beaches Act definition is used.

Question: Did you ask communities for receiving water data?

Response: We checked the permit files, but did not contact communities. We will go directly out to communities for the 2003 report.

Comment: Collecting data is a good start, but telling an accurate story is important as well. For example, while five percent of receiving waters may be coastal, if measured by population, the impact goes up dramatically.

Comment: It is important to note that before the CSO Policy, two-thirds of communities had dry weather overflow, now 278 of 301 report no dry weather overflows.

Question: The dry weather overflow number seems low. What could account for that?

Response: People do not like to report dry weather overflows. Also, there is a different interpretation of what dry weather overflow means.

Question: How many permit files were reviewed?

Response: 786 files were reviewed in 16 states.

Comment: It seems as if the ninth minimum control (monitoring) is not being implemented. Is anyone monitoring to see if they need an LTCP?

Response: Generally, they are doing monitoring to characterize their system, they are not conducting stream monitoring.

Comment: The Report to Congress should convey that environmental impact monitoring is not being conducted as intended in the CSO Control Policy to determine if LTCPs are warranted.

Comment: Include the percentage of communities that have completed their LTCPs.

Comment: It would be nice to have information broken out by size of community, flow, and rainfall as well.

Question: Will enforcement data be in the report?

Response: Yes.

Comment: Participants emphasized that the report should be useful to Congress. For example, point out progress and ensure that Congress understands that without additional funding it will be difficult to make more progress. We need to send the message to Congress that we need to spend the $40 billion necessary to repair this problem.

Summary of Day 1— Jeff Lape, Acting Director, Water Permits Division, Office of Wastewater Management, U.S. EPA Headquarters

We received a mandate for this report seven months ago. We realized that we did not have data, information, or analyses on which to base a progress report. Since that time, we have tried to define the universe, document progress, and list results but have encountered a paucity of data from previous analysis. Many of the necessary data collection tools are not in place for CSOs, let alone the entire NPDES program. Data system management (electronic, geo-referenced, and available systems) will be a priority for the NPDES program in the future.

Opening Remarks, Day 2—Mike Cook, Director, Office of Wastewater Management, U.S. EPA Headquarters

Mr. Cook discussed the political context, the state of water quality, and infrastructure issues as they affect CSOs. He told the group that EPA's Administrator is putting greater focus on wet weather issues, particularly as they feed into a larger context of having a holistic watershed approach for dealing with water quality problems. EPA's budget request for CSOs was $450 million.

Mr. Cook explained that there is a paucity of good water quality data. The state 305(b) lists are the primary source of data in this area. According to this source, 40 percent of the nation's water bodies have been characterized, but some have limited data. We do have good data on a few sources, such as in Boston and Chicago. We do know that many waters are impaired and that many of these impaired waters are targeted by TMDLs. Also, many of these impaired waters are in urban areas. These urban areas should remain the focus. EPA has court orders in 19 states to review TMDLs, some of which deal with point sources such as CSOs.

The new Administration has been influenced by a report from the National Academy of Sciences, which places an emphasis on biomonitoring and suggests keeping the TMDL program moving using an adaptive management approach. The report states that many water quality standards were put in place 25 or more years ago and are no longer appropriate. Before initiating work on TMDLs, EPA should look at the water quality standards and determine if they are appropriate.

Mr. Cook reminded the group of the frequent discussions at the federal and state levels about the cost of new regulatory requirements and unfunded mandates (e.g., arsenic standards, effluent guidelines), but explained that these discussions paled in comparison to the cost of replacing an aging wastewater infrastructure, which is estimated at $1–2 trillion, not including the cost of private connections. EPA estimates the cost of SSOs control to be $80–90 billion alone. These costs will only rise, so Mr. Cook believes that the time to act is now, but reminded the group to realize that progress will be incremental. Long-term strategies will be successful only when measured in decades.

He also commented that the social costs associated with future infrastructure needs are significant. Affordability will take on more importance as costs for these improvements rise. Mr. Cook explained that because the income of 60 percent of the nation's poorest citizens has remained steady, but sewerage rates have increased steadily, wastewater costs take a larger percentage of overall household costs. This causes two main problems for communities faced with significant infrastructure improvement needs: (1) poorer communities will not be able to afford improvements at all and (2) large communities may still be able to afford the user fees overall, but within the larger community there will be an increasing population that cannot afford the fees.

He reminded the group that this problem will be felt most severely at the local level, since local communities will bear most of the cost of infrastructure improvements. There will be political problems associated with this issue. For example, political difficulties have already been felt by politicians in California due to beach closures.

Preliminary Findings Discussion

The group then reviewed six preliminary findings designed to stimulate discussion and refine thoughts on how to interpret the data presented on Day 1.

Finding #1: The CSO universe is small (compared to the total POTW universe), regionally concentrated, diverse, and dynamic. EPA estimates that today the total number of permits covering CSSs is 860.

Reactions:

- The participants generally agreed that first finding has nothing to do with what was asked for by Congress (i.e., what EPA has done to enforce the Policy) and therefore does not warrant a finding. Findings should really be more punchy and tell the story better.

Recommendations:

- Should delete the word "small" because it diminishes the importance of the CSO problem. Instead, the report might want to state that 43 million people are served by CSSs and which Congressional districts are affected.
- Focus the report on how EPA, the states, and municipalities have implemented and enforced the CSO Control Policy.
- Incorporate downstream miles of waters impacted, beach closings, and lost recreational opportunities.

Finding #2: Issuance of the CSO Control Policy focused attention on the CSO problem and gave momentum to EPA development and implementation activities.

Reactions:

- For the most part, participants agreed that the Policy was a catalyst for action by EPA and all stakeholders. One asked that the sub-topics present more information. Another asked that the report focus on impacts on people and the environment, not on "administrative bean counting" and paperwork.
- In disagreement with the finding, one stakeholder suggested that public attention gave momentum to create the Policy, not that the Policy created attention and momentum.

Recommendations:

- Change the bullet that says "EPA has inspected." States have also done inspections.
- Put it all in the context of need. How much money has been spent? Say what the needs are today. Do not assume that data from the 1996 Needs Survey is current.
- Convey that there was an immediate benefit from the Policy. The NMC were immediately implemented (in some places).
- EPA does not implement this program, states and municipalities do.
- Point out that the general population is benefitting from CSO controls that the Policy catalyzed. The cities are now focusing on other issues—they look at all aspects of wet weather control. There is an additional private sector economic benefit.

Finding #3: The vast majority of states have incorporated some CSO Control Policy provisions into state permitting and/or enforcement approaches. State CSO programs remain highly diverse, and some aspects of state implementation of CSO Control Policy provisions have differed from the framer's expectations.

Reactions:

- Participants were concerned that there is a lack of consistency in implementation and enforcement.
- One stakeholder commented that these data are taken from enforceable documents only. Due to the permit backlog, voluntary activities would not be reflected in this analysis.
- Another pointed out that a state with 76 permittees can only negotiate one to two new permits each year. These constraints account for the diversity in CSO Control implementation.
- Tim Dwyer, EPA Headquarters Office of Water, noted that EPA had not provided guidance on water quality standards review until mandated in FY 1999. Also, no metrics exist to evaluate the success of NMC and LTCPs (e.g., reduction in volume, flow, and duration of CSO discharges). Please see the section on water quality standards review for more detail.

Recommendations:

- Mention that more water quality reviews have occurred, but they are not all documented. Please see the section on water quality standards review.

Finding #4: Most municipalities have a clearer understanding of CSO control requirements as a result of CSO Control Policy. Adoption of BMPs to reduce CSO discharges is widespread. Progress in long-term, capital-intensive projects has been slower. Nationwide there are success stories in communities where CSO discharges have been eliminated or substantially controlled.

Recommendations:

- One stakeholder asked for discussion of water quality standards reviews in this section.
- Explain what the federal government, states, and municipalities have done to enforce the NMC.

Finding #5: The CSO Control Policy is unique with respect to its genesis, content, coordination, and flexibility. These qualities make its implementation different from other water pollution control efforts and make objective assessment of progress more difficult.

Reactions:

- Participants generally agreed that this finding was unimportant and could either be noted as a footnote or be cut completely. They did not want the findings to state that the Policy was unique, rather that the CSO problem is. They also wished to note that the flexibility built into the Policy cannot be utilized to its full degree if water quality standards revisions are not occurring.
- Another criticism was that the only flexibility in the Policy to date is in NMC implementation.
- Meeting water quality standards, as opposed to technology-based standards, is a primary difficulty in CSO Policy implementation.

Recommendations:

- The Policy needs tinkering. There are many components to the water quality equation, and this needs to be made clear.

Finding #6: States and communities have accomplished important environmental objectives as part of their CSO control efforts to date. However, despite the CSO control efforts on the part of EPA, states, and municipalities, much more needs to be done. More environmental data are needed to fully assess effectiveness of CSO controls and the attainment of environmental outcomes, including water quality standards. Information reporting and management, as it currently exists in most cases, is inadequate to determine accomplishments.

Reactions:

- The general consensus of the group was that much more needs to be done on collecting and monitoring information.

Recommendations:

- Finding number two is misleading because only state permit files were addressed. Should either drop or make more explicit.
- One stakeholder requested that cost information be included in this finding.
- Point out that once CSO work has been done, a stream still may not be clean.
- Another stakeholder pointed out that wet weather monitoring is complicated and that many municipalities lack the technical expertise to design and implement a monitoring program. It was requested that the finding convey this difficulty.

Additional Findings Suggested by Participants

Water Quality Standards

EPA should put everything in the context of greater watershed management. Explain how CSOs are one of the things that impact water quality and that CSO control is a step towards overall watershed improvement. Describe what water quality is, what revisions entail, and the details of the one existing water quality standards review. Mention that other water quality reviews have occurred, but they are not all documented. Say that revisions are not occurring. Explain use attainability analysis and explain that if revisions do not occur, the cost of control is going to rise (the cost of control is based on the assumptions of the presumptive approach, 4-6 overflows/year). Explain that the Policy was intended to encourage permitting people to meet with water quality standards people, but these meetings are not occurring. Water quality standards people need to be engaged more.

EPA Leadership

EPA needs to exercise more leadership regarding water quality standards revisions. Start by talking about it more in the report. Perhaps the review can be incorporated more with the LTCP process. The public consultation process is not occurring and that is an area where EPA can have some impact.

Enforcement

Since 1994, the CSO Control Policy has been non-binding, so the regulated community has developed varied levels of response. The role of NPDES authorities in the CSO issue has been less forceful than in other EPA policies. Now, with the addition of the "shall conform" language, stakeholders want more guidance from EPA to enforce the Policy in a consistent manner. Some NPDES authorities have actively enforced the CSO Policy and encouraged EPA to report details on enforcement actions.

Funding

There needs to be better public education about the costs and consequences of CSO control. Action has been spurred in some cases because of sewer crises, which dissolves opposition, but some communities have approved sewer improvements without understanding what that would actually entail. They are now having trouble making payments. The lack of grant money places much of the financial burden on municipalities. Long-term schedules must be reasonable in light of funding capabilities. Involvement by Congressional and state representatives increases funding options and decreases local share.

Elaboration on funding options was requested by some participants. It was requested that EPA make some mention that some states issue SRF loans with additional interest that may deter use of these funds. Many stressed that grants would be more helpful to small communities than loans. Many participants were concerned about the funding burden to local communities and requested that this report illuminate the costs of CSO abatement. There was agreement that the flexibility inherent in the CSO Control Policy eased some of the burden, but that additional state and federal assistance was needed. The schedule of payments should be long-term, not short-term, and be tailored to the public's ability to pay. Extending schedules for implementation and payment would help defer costs. The SRF infrastructure is in place, but may need to be adapted for CSO control. The possibility of providing grants through Clean Water SRF programs was noted. A good model for this is the Drinking Water SRF.

Some stakeholders questioned the equity of CSO funding. Distribution of income in urban areas and regional economics make some less able to pay. One stakeholder claimed that in Saginaw, Michigan, a city which undertook expensive CSO controls, 25 percent of the ratepayers cannot pay their bills and that bond payments on detention basins will bankrupt the city within five years. Assistance to economically disadvantaged communities will not necessarily help large, urban areas, which might require financial assistance but do not meet the criteria. Some suggested making zero or negative interest loans through the SRF or providing an equivalent tax incentive for users. Perhaps SRF could be changed to make grants available to poor communities, though safeguards would be necessary to prevent abuse. There was some disagreement of the viability of loans versus grants. Some suggested that grants would encourage regulators to give to those who can show environmental benefits and for municipalities to better quantify those benefits in order to get funding.

Additional Comments from Stakeholders

Definitions

- Many participants felt that the distinction between CSOs and SSOs was not clear. Another wondered if the number of communities that reported CSOs would rise again, as SSO controls become more stringent. An EPA representative noted that many SSO communities would like to be treated like CSO communities when under enforcement actions.
- Clarify terminology: permittee versus CSO community; major/minor distinction; and definitions of SSO versus CSO. The definition and inclusion of satellite communities should also be made explicit. Incentives for reporting CSOs versus SSOs should be investigated.
- Make clear the distinctions between EPA, NPDES permitting authority, and states.
- Should convey that LTCPs are only plans and that actual spending has not happened yet.
- Define and explain urban wet weather problems.
- Distinguish between small, urban tributaries and complex river systems.
- Do not use the term "Best Management Practice."
- One stakeholder requested that local governments be given credit for implementation and that EPA claim to create only policy and guidance.

Data

- Note that the only monitoring data reviewed was at state or EPA level, not each permittee's data.
- report should describe enforcement processes and enumerate enforcement actions for CSO violations.
- Include a more detailed discussion of information management related to CSOs ("incomplete, inaccurate, obsolete").
- Identify the number of political jurisdictions (communities) in the 860 permittees. Try to incorporate 2000 Census data.
- Look beyond the permit files for NMC data. Some states have asked for NMC reports as part of the permit process—these would not be reflected in actual permit files. Also, should look at permits issued prior to 1994 that have not been reissued.

- Report should have more detail of which CSO controls are being implemented.
- Report should list and discuss the number of communities that have completed LTCPs.
- Report should mention initial estimates of the size of the CSO community (1300) and the reason for the apparent decline in that number to 860. The report should include the number of communities that have separated their systems.
- Answer the question of how many CSO discharges were in violation of water quality standards at the time of the Policy and how many discharges are in violation today (hopefully the former is greater than the latter).
- Mention that some water quality reviews have occurred, but they are not all documented.
- Need standard metrics for permittees to quantify compliance (frequency of CSOs, volume, duration). What about biological indicators? Many of the success stories are anecdotal, not based on documented and technical data.
- Explain what the federal government, states, and municipalities have done to enforce the NMC.

Report Format

- Some participants felt that this format does not answer the questions asked by Congress.
- There is a need to address the context and intended audience of this report. This report is not intended to make recommendations; it is to present what has been done to implement and enforce the Policy. The report should state progress, needs, and how Congress can help.
- Tell Congress that 43 million people are served by CSOs (how many Congressional districts?). Also, bring in regional and downstream miles impacted, lost recreational opportunities, and beach closings.
- The differences between the four approaches to the Policy taken by NPDES authorities should be made clear, as well as the legal implications of the various approaches. Another participant wanted to simply state whether or not the NMC are required.
- Include mention of other activities being performed by states that may compete with CSOs as a priority (e.g., CAFOs, storm water, etc.). CSO enforcement has not been a priority because it has been just a policy for so long. One participant recommended looking at the Inspector General's Report, with particular attention to siting concerns for water pollution control projects in New York.
- Report should discuss the obstacles to NPDES programs (CAFOs, storm water, etc.) as reason for flexibility in the CSO Policy.
- Determine what goals and objectives EPA wants the report to accomplish. Then go back and write findings that focus on those.
- Report should be structured around the three "legs" of the Policy: (1) NMC; (2) LTCP to meet water quality standards; and (3) reviews and revisions of water quality standards. The third leg has not happened. NMC #9 ("monitoring to effectively characterize CSO impacts and the efficacy of CSO controls") is not being faithfully implemented. Describe water quality standards review process for Congress. Participants wanted more discussion on water quality standards review and revision and a clear standard from EPA on how to conduct reviews of water quality standards.
- Enforcement of the Policy should have a separate finding that includes actual data on enforcement actions.
- Do not be shy in saying that the states have not done their jobs.
- State what EPA is planning to do in the future.
- EPA should tell Congress that there are long-term social issues associated with CSOs related to the distribution of income in cities. This is a social problem that resulted from the development of the country.

Closing Comments—Mike Cook, Director, Office of Wastewater Management, U.S. EPA Headquarters

Mr. Cook thanked the participants for coming and reminded them that EPA does not have time to gather all the information requested, but they will do what is possible for the September 2001 Report and consider all of the comments for the 2003 Report. He reminded participants that a summary of the meeting that reflects all of the group discussion will be sent out to the participants. EPA still needs to do some thinking about what Congress will do with this report. There may be hearings based on the findings of the report. They may respond legislatively. They may set aside some funding to address the problem, hopefully in a larger watershed context.

Appendix I-1—Attendees

Name	Affiliation
Shadab Ahmad	New Jersey Department of Environmental Protection
Beverly Banister	US EPA Region 4
Emily Bergner	Prairie Rivers Network
Andre Borrello	City of Saginaw, Michigan
Pat Bradley	US EPA Headquarters, Office of Water
Ross Brennan	US EPA Headquarters, Office of Water
Robert Chominski	US EPA Region 3
Mike Cook	US EPA Headquarters, Office of Water
Robert Coontz	West Virginia Department of Environmental Protection
Fred Cowles	Michigan Department of Environmental Quality
Kevin DeBell	US EPA Headquarters, Office of Water
Joseph DiMura, PE	New York State Department of Environmental Conservation
Tim Dwyer	US EPA Headquarters, Office of Water
Atal Eralp	US EPA Headquarters, Office of Enforcement and Compliance Assurance
Albert Ettinger	Environmental Law & Policy Center (ELPC)
David Evans	McGuireWoods LLP
Jim Filippini	US EPA Region 5
Gordon Garner	Louisville/Jefferson County Metropolitan Sewer District, Kentucky
Frank Greenland	Northeast Ohio Regional Sewer District
Michael Irwin	Missouri Department of Natural Resources
Stephen John	Environmental Planning and Economics, Inc.
Jeffrey Jordan	City of South Portland, Maine
Carol Kocheisen	National League of Cities (NLC)
Louis Kollias	Metropolitan Water Reclamation District of Greater Chicago
Richard Lanyon	Metropolitan Water Reclamation District of Greater Chicago
Jeff Lape	US EPA Headquarters, Office of Water
Walter Brodtman	US EPA Headquarters, Office of Enforcement and Compliance Assurance
Dean Marriott	City of Portland, Oregon
Tom McSwiggin	Illinois Environmental Protection Agency
Rob Moore	Prairie Rivers Network
John Murphy	City of Bangor, Maine
Linda Murphy	US EPA Region 1
Paul Novak	Ohio Environmental Protection Agency
Jim Novak	US EPA Region 5
Tim Oppenheim	Friends of the Chicago River
Laurel O'Sullivan	Lake Michigan Federation
Reed Phillips	City of Saginaw, Michigan
Mark Poland	CSO Partnership
Joseph Rakoczy	Metropolitan Water Reclamation District of Greater Chicago
Greg Schaner	Association of Metropolitan Sewerage Agencies
Eric Seaman	Missouri Department of Natural Resources
Nancy Stoner	Natural Resources Defense Council
Phil Sweeney	US EPA Region 2
Peter Swenson	US EPA Region 5
Sharon Thomas	Water Environment Federation
Edward Wagner	CH2M Hill
Mike Wagner	US EPA Region 1
Clyde Wilber	Greeley and Hansen, LLP
LaJuana Wilcher	LeBoeuf, Lamb, Greene and MacRae, LLP

Appendix I-2—Agenda

Agenda for Stakeholders Meeting on the Report to Congress on Combined Sewer Overflows

July 12 – 13, 2001—Palmer House Hilton, Chicago, Illinois

Purpose

CSO experts from around the country will gather to:

- Discuss the data, report methodology, and analysis of the Report to Congress;
- Discuss the implications of the major findings of the report;
- Discuss participants' experiences under the CSO Policy; and
- Discuss future directions, including activities related to the Wet Weather Quality Act of 2000.

Thursday, July 12, 2001

12:00–1:30 Lunch and Opening Remarks: Progress in Controlling CSOs

Opening Remarks—Tom McSwiggin, Bureau of Water, Permits Office, State of Illinois

Mr. McSwiggin is a long-time expert in the CSO field and was one of the founders of the 1994 CSO Policy. Mr. McSwiggin will welcome participants to Chicago and offer views on his State's experiences in CSO control.

Progress in Controlling CSOs—Jeff Lape, Acting Director, Water Permits Division, U.S. EPA

Mr. Lape played an active role in the formation of the 1994 CSO Policy. He will provide an overview of the 1994 CSO Policy and subsequent milestones.

1:30–1:45 Break

1:45–5:00 Briefing and Discussion of Major Elements of the 2001 Report to Congress

Using a briefing-discussion format, the group will participate in focused discussions of the major elements of the Report to Congress, including methodology and scope, data gathered, and findings.

Evening Social event, to be determined

Friday, July 13, 2001

8:30– 8:45 CSO Policy and Future Directions

Michael B. Cook, Director, Office of Wastewater Management, U.S. EPA

Mr. Cook has been the Director of U.S. EPA's Office of Wastewater Management since 1991. Among his many duties, he is responsible for managing the national NPDES program and is a noted leader in the environmental field. Mr. Cook will offer his views of the CSO Policy and its future.

8:45–10:00 Interpreting the Data and Findings of the 2001 Report to Congress

Participants will discuss the major findings of the report as a whole. Key questions may include:

(1) Are the wide variety of approaches that currently exist for CSO control a negative or positive outcome of the CSO Policy?

(2) How does this flexible approach impact regulators? Municipalities?

10:00–10:15 Break

10:15– 11:45 The Future Directions in CSO Control

In smaller discussion groups participants will discuss the CSO Policy in a broader context. Key topics will be determined based on conversation from Day 1.

11:45–12:00 Closing Remarks and Next Steps

Appendix J

Summary of CSO-Related Enforcement Actions Initiated by EPA After Issuance of the CSO Control Policy

Civil Judicial Actions Taken by EPA Under the CSO Control Policy

Region	State	Case Name/City Name	Description
3	PA	Erie	Action taken to address failure to comply with effluent limits. Judicially ordered consent decree required separation of 5,000 feet of sewer.
4	GA	City of Atlanta	Action taken to address non-attainment of water quality standards resulting from CSOs. Judicially ordered consent decree required evaluation of CSO discharges and remedial action plan completion by 07/01/07; $3.2 million penalty; and $27,500,000 supplemental environmental project.
5	IN	Hammond Sanitary District	Action taken to address 19,000 violations of the CWA; judicially ordered consent decree; $225,000 penalty; $2.1 million to restoration; and $34 million in system improvements.
5	OH	City of Akron	Action taken to address CSOs causing violation of effluent limits and failure to meet schedule for elimination of CSOs. Judicially ordered consent decree: $290,000 penalty.
5	OH	City of Port Clinton	Action taken to address violation of NPDES permit. Judicially ordered consent decree required monitoring, scheduled CSO abatement: $60,000 penalty.

Administrative Actions Taken by EPA Under the CSO Control Policy

Region	State	Case Name/City Name	Description
1	MA	Agawam	Administrative compliance order (9/95) required abatement schedule for CSOs to Connecticut River.
1	MA	Agawam WWTP	Action taken to address CSO discharges in violation of permit. Administrative compliance order issued 12/30/96.
1	MA	Chicopee	Administrative compliance order (9/95) required abatement schedule for CSOs to Connecticut River.
1	MA	Chicopee WPCF	Action taken to address CSO violations. Administrative compliance order issued 06/06/97 required LTCP.
1	MA	Chicopee WPCF	Action taken to address violation of permit requirements and discharge without permit. Administrative compliance order (06/03/99) to eliminate dry weather overflows and develop an LTCP.
1	MA	Gloucester	Action taken to address violation of permit. 1989 Consent Decree required LTCP development; LTCP received 4/01.
1	MA	Greater Lawrence SD	Action taken to address violation of permit requirements. Administrative compliance order (06/24/99) ordered District to develop an LTCP.
1	MA	Holyoke	Administrative compliance order (9/95) required abatement schedule for CSOs to Connecticut River.
1	MA	Holyoke WPCF	Action taken to address CSO discharges in violation of permit. Administrative compliance order issued 03/21/97.
1	MA	Ludlow	Administrative compliance order (9/95) required abatement schedule for CSOs to Connecticut River.
1	MA	Ludlow WTP	Action taken to address CSO discharges in violation of permit. Administrative compliance order (issued 12/30/96) required NMC.
1	MA	Massachusetts Water Resources Authority	Administrative compliance order (05/13/96) required plan and enforcement actions to attain WQS.
1	MA	South Hadley	Administrative compliance order (9/95) required abatement schedule for CSOs to Connecticut River.

Administrative Actions Taken by EPA Under the CSO Control Policy—Continued

Region	State	Case Name/City Name	Description
1	MA	South Hadley WTP	Action taken to address CSO discharges in violation of permit. Administrative compliance order issued 03/14/97.
1	MA	Springfield	Administrative compliance order (9/95) required abatement schedule for CSOs to Connecticut River.
1	MA	Springfield Regional WWTP	Action taken to address CSO discharges in violation of permit. Administrative compliance order issued 03/21/97.
1	MA	Springfield Water & Sewer Commission	Action taken to address CSOs. Administrative compliance order for abatement of CSOs filed 11/14/00.
1	MA	Taunton	Action taken to address permit violations. Administrative compliance order (9/24/94).
1	MA	Town of Fitchburg	Action taken to address permit violations. Administrative compliance order issued 07/96 required NMC and LTCP; Town is proposing separation.
1	MA	Town of Haverhill	Action taken to address CSO discharges in violation of permit. Administrative compliance order (08/09/99) to complete Phase II of the LTCP by January 15, 2001.
1	MA	Town of Palmer	Action taken to address CSO discharges in violation of permit. Administrative compliance order issued 01/06/97; penalty payment of $5,000.
1	MA	West Springfield	Action taken to address CSO discharges in violation of permit. Administrative compliance order (9/95) required CSO abatement schedule.
1	MA	Worcester	Action taken to address permit violations. Administrative consent order for NMC and LTCP.
1	ME	Augusta	Administrative compliance order for CSO abatement schedule.
1	ME	Biddeford	Administrative compliance order 04/22/94 required CSO abatement schedule.

Administrative Actions Taken by EPA Under the CSO Control Policy—Continued

Region	State	Case Name/City Name	Description
1	NH	Lebanon WWTP & City STP	Action taken to address CSO discharges in violation of permit. Administrative order (6/6/00) requires City to eliminate six CSOs by 12/31/08 and to submit a plan to EPA by 12/31/05 to eliminate the seventh CSO by 12/31/12.
1	NH	Manchester STP	Action taken to address non-attainment of water quality standards caused by CSOs. Administrative compliance order (03/08/99) requiring CSO abatement and $5.6 million supplemental environmental project (SEP).
1	NH	Nashua	Administrative compliance order required CSO abatement by 12/31/19.
5	IL	City of Rock Island	Action taken to address CSOs to environmentally sensitive area and failure to implement the NMC. Administrative compliance order filed 02/13/98 requires plant and sewer improvements to reduce CSOs.
5	IN	Bluffton POTW	Action taken to address violation of permit by failure to submit CSO plan. CSO plan received. Administrative penalty order filed 6/6/00 requiring SEP and $30,000 penalty.
5	IN	Fort Wayne	CSOs in violation of permit and SSO violations resulted in the issuance of two administrative orders in 1995 and 1996.
5	OH	Port Clinton	CSOs in violation of permit resulted in a 1995 administrative order and subsequently a judicial referral.

Appendix K

Summary of Planned Research by EPA's Office of Research and Development

Summary of Planned CSO-Related Research

Research Need	Study Name	Description
Develop monitoring methodologies to measure the characteristics and impacts of wet weather flows.	CSO Monitoring	Provide a methodology with widespread applicability for statistically calculating CSO quality data based on historical rainfall and WWTP quality data. Examine wet weather monitoring programs nationwide to identify the wet weather monitoring provisions of a NPDES permit and the relationship of monitoring to the effectiveness of the storm water management program.
Determine wet weather flow receiving-water impacts and impaired beneficial uses that can be attributed to chemical, biological, and especially physical stressors.	Large River Pollution	Develop a methodology to assess the wet weather impacts of CSOs and other point and NPSs of pollution within a watershed on a large river (the Ohio River) and for evaluating the effectiveness of alternative CSO control measures.
	Water Body Impacts Model	Develop a baseline assessment of the risks to aquatic life, and human health in the Duwamish River and Elliott Bay in King County, Seattle, WA. This effort will assess the following: (1) the baseline risk to aquatic life and humans who use the River and Bay; (2) the benefits to be gained by various levels of CSO control; and (3) the risks resulting from discharge of effluent to the Duwamish during peak flows.
To assess the effectiveness of disinfection techniques.	CSO Disinfection	Assess the effectiveness of various disinfection techniques for CSOs, including rapid oxidants and UV disinfection. Techniques for measuring microorganism population that accounts for microorganisms that survive in the interstices of the larger organic particles and in the micro-fractures of soil grains (e.g., blending the samples, sonification) will be used in assessing disinfection effectiveness.
To address the goals of watershed management projects.	Watershed Modeling	Review existing computer models related to urban wet weather flows, to determine which models are compatible with the watershed approach. The models will then be studied to determine how they can be integrated to include all drainage (SW, CSOs, SSOs, and NPSs) and receiving waters; and other watershed relationships, such as: storm water-groundwater interactions; sediment migration patterns; human and ecological risk from toxic substances; control practices and pollution prevention effects; and atmospheric deposition.
	Storm water-Groundwater Interactions	This project will interface storm water runoff with groundwater, to gain a better understanding of the groundwater connections to surface water. Naturally occurring water isotopes during storm events will determine the components, pathways, and residence time of subsurface WWF discharging into surface receiving waters. These objectives will attempt to determine if isotopic techniques can help performance evaluation of source controls and collection system controls for abating CSOs.
	Mill Creek Watershed Plan	Develop an integrated watershed management plan to assess and control CSOs and other pollution sources within the Mill Creek Watershed (Ohio). Establish a process and develop decision criteria for selecting appropriate and cost effective wet weather flow controls. Identify and resolve plan implementation barriers. The ultimate goal of the project is to achieve community wide consensus on an integrated implementation plan for the attainment of water quality and ecosystem goals.

Research Need	Study Name	Description
	Rouge River Restoration	Demonstrate effective solutions to water quality problems facing an urban watershed highly impacted by wet weather flows and develop potential solutions and implement projects to restore water quality in the Rouge River, Wayne County, Michigan. Develop tools for watershed analysis and planning. Evaluate various wet weather flows control prototypes, including designs of CSO detention basins and storm water runoff quality control BMPs.
To develop and demonstrate advanced collection system design alternatives to reduce wet weather overflows.	CSO Measures of Success	The Association of Metropolitan Sewerage Agencies (AMSA) is working with CSO stakeholders to determine the effectiveness of their CSO control programs in achieving the objectives of the CSO Policy. The project will identify indicators that stakeholders can use to effectively measure the success of CSO control programs, that include: (1)programmatic, (2) in-stream, (3) end-of-pipe controls, and (4) ecological and use attainability.
	Flow Balance Method (FBM)	The project is an expansion of the original pilot-scale project initiated in 1987 and will evaluate CSO capture effectiveness for WWTP pumpback. The earlier phase of the project demonstrated that effective CSO control is achieved by the FBM and its principals of operation and sea-worthiness.
	Storage Facilities Design	The scope of this project includes: (1) compiling existing data on the effectiveness of CSO, storm water, and SSO storage, sedimentation, and treatment methods; (2) verifying recommended storage/treatment approaches through computer modeling; (3) finalizing a 1981 EPA report currently in the draft final form entitled Storage/Sedimentation Facilities for Control of Storm and Combined Sewer Overflows Design Manual; and (4) developing a second volume to this document as a more detailed engineering manual for storage/treatment optimization.
	Real-Time Control by Radar	Demonstrate application of a radar-based rainfall monitoring system, CALAMAR, to maximize the in-line CSO storage capacity. CALAMAR will provide the sewerage operators with advanced warning of storm water accumulation in different catchments at a given time. This will allow the operators to store and route the flow in the most efficient manner, optimizing the CSO in-line storage capacity. It also prevents releases of untreated CSO during a rain event.
Develop and demonstrate high-rate and high-efficiency treatment technologies suitable for retrofitting existing WWTPs as well as for new installations.	CSO Vortex Controls	A side-by-side, full-scale demonstration of three different types of vortex units primarily for floatables removal and secondarily for other pollutant removals; using three 43-foot diameter vortex units of varying depths. The results obtained from this facility will have potential application to over 400 outfalls in New York City. The sampling and analysis program includes: floatables (sampled with small aperture mechanical screens at strategic points throughout the facility), suspended solids, BOD, nutrients, and bacteria (sampled from multi-port continuous flow stream sampling devices connected to automated samplers).

Research Need	Study Name	Description
	Retrofitting Control Facilities	Investigate the retrofitting of existing sewerage systems to handle additional wet weather flow (SSO, storm water and CSO) by: (1) increasing the hydraulic loadings at the control facilities, and (2) increasing the amount of storage in the conveyance system. It will investigate: (1) converting existing “dry-ponds” (ponds that drain and go dry between storm events) to “wet-ponds” for separate storm water systems to enable treatment through sedimentation, and (2) converting or retrofitting primary settling tanks to dissolved air flotation and lamellae and/or microsand-enhanced plate or tube settling. Retrofitting processes will better enable communities to meet the CSO Policy.
	CSO Concepts for Stormwater	Produce methodologies for applying CSO control and treatment methods to improve separate storm water systems. Examine applicable storage, treatment and flow-control techniques currently practiced in CSO systems. The goal will be to maximize the treatment capacity of the existing systems.
	Vortex/ Disinfection Treatment	Demonstrate on a full scale, the applicability of new processes for the treatment of CSOs. Specific goals of this project include: providing comparative process results for various treatment technologies; providing design criteria and capital and O&M costs; determining efficient and appropriate control techniques thereby reducing overall CSO control costs and more effectively solving the pollution problem at its source; and determining cost-effective methods to minimize hydraulic load impacts on the wastewater treatment plant, thereby providing more capacity for handling wet weather flows, such as infiltration/inflow, and preventing SSOs.
	Crossflow Plate Settlers	This project will demonstrate CSO treatment using an existing WWTP primary settling tanks retrofitted with crossflow plate settlers. The successful application of plate settling technology will provide a way to decrease cost of CSO control and will decrease the need for newly constructed storage and treatment facilities and additional land requirements.
	High-Rate Ozonation	Ozonation will be evaluated as an alternative disinfection process for CSO; as conventional disinfection technologies cannot be readily applied to CSOs (due to varying flow rates and resulting water quality). Ozonation is known to have the highest oxidizing power, and due to its high reactivity with water, does not carry residual. A one million gallon/day pilot project is proposed that will provide for the design, construction, operation, and maintenance of a full-scale ozone CSO disinfection system in Fresh Creek with the goal of reducing microbial pollution to Jamaica Bay, New York.

Research Need	Study Name	Description
	Triple Purpose Storage	Demonstrate the successful CSO storage concept as applied to separate storm drainage, sanitary sewer, and combined sewer system discharges. Multipurpose storage should include: storm water and inappropriate non-storm water discharges from storm-drainage; CSO; and dry weather flows from combined or sanitary sewers. Auxiliary storage functions may include sedimentation treatment, flood protection, flow attenuation, dry weather flows capture and attenuation, sewer relief, and low-flow augmentation.
	Constructed Vegetative Treatment Cells (CVTC)	This project supports the development and implementation of Constructed Vegetative Treatment Cells (CVTC) for CSO remediation. CVTCs function as a physical/biological treatment system. This demonstration will generate monitoring, process control, and O&M data necessary to facilitate widespread implementation of CVTC technology for CSO remediation.
	CSO Optimization Paper	Describes a strategy to optimize a CSO control system. This optimized system maximizes the use of the existing system before new construction and sizes the storage volume in concert with the WWTP treatment rate to obtain the lowest cost storage and treatment system. The paper was peer reviewed by the Journal of the Environmental Engineering Division, ASCE and was published in March 1997.

Appendix L

List of Recipients of National Combined Sewer Overflow Control Policy Excellence Awards

CSO Control Program Award Recipients

Year	Award	City	Description of CSO Program
2000	1st Place	City of Saco, ME	Eight CSO construction and BMP projects including sewer separation, I/I reduction, and constructing a new secondary clarifier. In 1997, the city enacted a CSO impact fee to fund the CSO Capital Abatement Plans.
	2nd Place	City of Corvallis, OR	CSO remediation program that include storage (including a 10 MG storage lagoon), transport, and treatment (a 35 mgd Wet Weather treatment facility and a 3 mgd wastewater treatment plant expansion.
1999	1st Place	Richmond, VA	Phased CSO control program to protect the James River; components include wastewater treatment plant improvements, disinfection, swirl concentrators and storage basins. City's program will eliminate overflows to the major park area along the James River during the summer and significantly enhance recreational activities.
	2nd Place - tie	Auburn, NY	Program uses a centralized high-rate treatment facility, in-line and off-line storage of wet weather flows, and four regional high-rate treatment facilities to eliminate overflows from its CSO and separate sewer system. Program eliminated 31 of 35 CSOs and SSOs with remaining four CSOs receiving high-rate treatment for floatables and setteable solids removal and disinfection.
	2nd Place - tie	Columbus, GA	Program includes sewer separation, diversion with floatables control, and transport and treatment for solids removal and disinfection. Long-term program integrated community development projects with public inputs throughout process.
1998	1st Place	Saginaw, MI	Implemented a three-phased program based on six retention/treatment basins (RTBs), two of which include vortex separators. Program added over 60 MG of storage.
1997	1st Place	Augusta, ME	Implemented First Phase of four-phase, 15-year CSO Control Program; major components of program are a high flow management facilities at the WWTP and elimination of 13 CSOs through BMPs, regulator adjustments, and selected sewer seperations.
	2nd Place	West Lafayette, IN	Construction of a new interceptor sewer in conjunction with a new highway bypass, saving ratepayers $1 million; construction of new wet weather treatment facility to treat wet weather flows in excess of 22.5 mgd. Wastewater treatment plant improvements allows West Lafayette to treat nearly 83 percent of its annual wet weather volume; implementation of full CSO Control Program will reduce annual untreated CSO volume by approximately 95 percent an the duration of untreated CSO discharge by nearly 96 percent.

Year	Award	City	Description of CSO Program
1996	1st Place	Bangor, ME	Program focused on elimination of CSOs in two sensitive areas. Eliminated eight of the city's 22 CSOs and reduced overflow occurrences for several others; LTCP contains 23 projects including several multi-year sewer separation projects, and upgrading of the treatment plant to handle 13 mgd of combined sewage.
	2nd Place	Bath, ME	Developed CSO abatement program to address its 10 CSO outfalls to the Kennebac River. Bath's LTCP consists of implementing creative and practical BMPs, optimizing existing facility capacities, and developing systematic and cost-effective capital improvement projects.
1994	1st Place	Metropolitan Water Reclamation District of Greater Chicago, Chicago, IL	Developed two-phased $3.6 billion Tunnel and Reservoir Plan (TARP) project designed to eliminate CSOs and significantly reduce basement flooding. The completion of both phases was designed to reduce BOD loads to area's waterways from CSOs by 99 percent and will reduce flood damage by nearly 65 percent.
	2nd Place	City of Lansing, MI	Received Federal Construction Grant Program to improve the wastewater collection and treatment system; improvement took the form of relocating regulators out of the influence of the Grand River up the ten-year flood elevation to prevent river back flow into the collection system. The City replaced mechanical regulators with leaping orifice regulators designed to discharge to the interceptor all dry weather flows.
1993	1st place	City of San Francisco, CA	$1.4 million in construction cost program to eliminate discharge of CSO to the city's shoreline. The program constructed storage/treatment facilities to hold combined stormwater at the wastewater treatment plant, and to provide treatment for peak wastewater flows.
	2nd place	Decatur, Illinois	Constructed four satellite CSO treatment facilities and capture of first flush of each storm event in tanks for later treatment at the treatment facility. As a result, the odors and fish kills in the Sangamon River that were prevalent before the CSO program were eliminated. Results of a July 1991 biological and water quality survey indicated significant improvement in aquatic habitat over 40 miles of the river.
1992	1st place	New York, NY	Innovative approach to CSO abatement and floatable capture; while proceeding on plans on a large scale facility, operations-based projects provided some CSO abatement at a major four-barrel outfall at a low-cost (approx $1/gallon).
	2nd place	Minneapolis-Saint Paul - South Saint Paul, MN	Implemented 10-year program to eliminate CSO system. Achieved goal of 60 percent volume removal after the fifth year.
1991	1st place	Monroe County/City of Rochester, NY	Program included BMP improvements to existing facilities, deep-rock storage and conveyance tunnels, and wet weather preliminary treatment facilities; cleaned and relined existing trunk sewers to handle increased flows; program increased recreational use of the area's waterways, increased public awareness of environmental issues and increased land-based recreation.

Appendix M

Summary of Outcomes of
104(b)(3) Grants

Summary of Outcomes of 104(b)(3) Grants

Grantee	Description	Federal Contribution	Years	Results
AMSA	Performance Measures for CSO Control; Grant Number CX823736-01	$294,000	9/1/94 - 1/31/97	AMSA developed a series of performance measures for utilities and local government agencies to use to track benefits associated with CSO control. The study received input from a CSO stakeholder workgroup, focus group meetings, environmental groups, and state and federal permitting authorities. All 24 identified performance measures were considered to be appropriate for general use by CSO communities; four of these were also found to be appropriate for national tracking.
City of Indianapolis	Wet Weather Public Education Program; Grant Number GX825886-01	$112,000	7/24/97 - 7/31/99	Indianapolis designed an educational program to inspire its residents to take action to improve water quality during wet weather events. A video and slide presentation was created to explain current wet weather issues facing Indianapolis and the actions being taken by the city to address those issues. The City of Indianapolis also established a Citizen Advisory Committee (CAC) to assist city officials in selecting media campaign messages and materials and to provide input regarding cost/benefit decisions for water quality improvement projects. Other components of the educational program include a campaign plan, five brochures, media kits and surveys to gauge needs/knowledge base of the public.
Low Impact Development (LID) Center	Feasibility of Applying LID Stormwater Micro-Scale Techniques to Highly Urbanized Areas in Order to Control the Effects of Urban Runoff in CSOs	$110,000	4/99 - 4/00	A literature review was conducted to determine the availability and reliability of data to assess the effectiveness of LID practices for controlling stormwater runoff and reducing pollutant loadings to receiving waters. Background information concerning the uses, ownership and associated costs for LID measures was also compiled.
ORSANCO	Wet Weather Study of Ohio River; Grant Numbers CX825699-01 and CX824105-01	$1,383,000	7/1/97 - 12/31/01	ORSANCO developed a water quality model of the Ohio River capable of assessing CSO impacts and evaluating CSO controls on the river. The goal was to develop a model not only for the Ohio River but one that was suitable for evaluating other large rivers systems. In addition to CSO loads, stormwater and non-point source load estimates were included in the model to demonstrate the effect other wet weather pollutant sources have on large river systems. Watershed planning and wet weather monitoring protocols were also included in the model approach as a demonstration on how to incorporate these concepts in a large river system model.

Grantee	Description	Federal Contribution	Years	Results
CSO Partnership	Development of an Outreach Mechanism and Materials for CSO Communities; Grant Number CX823975-01	$176,500	10/94 - 2/99	This assistance project was designed to provide informational outreach to CSO communities nationwide. To reach this goal, the CSO Partnership developed two newsletters: the CSO Update and its supplement, CSO Bulletins. These publications reported on regulatory, financial, technological, and legislative changes in CSO controls. The CSO Partnership also used the publications to distribute surveys to municipal officials and other interested parities involved in CSO control. The information gathered from the surveys on municipal concerns, questions, experiences, and insights were made available to EPA and published in subsequent newsletters by the Partnership. The mailing list for these publications include CSO coordinators and stakeholders for over 1000 CSO communities nationwide.
California State University	Training Video	$245,000	7/96 - 7/98	California State University developed a video training program on how to effectively operate and maintain collections systems. The video course was presented in the form of six 30-minute sessions that were meant to compliment the two volume EPA guide on Operation and Maintenance of Wastewater Collections Systems. A user survey was developed to be distributed with the video training program. Survey results were shared with EPA officials to provide comments on recommended improvements for the training program and the need for additional videotapes.
CSO Partnership	Development of CSO Handbook for Small Communities; Grant Number X825552-01	$181,000	4/97 - 4/99	Between November 1997 and September 1998, the CSO Partnership presented a series of six workshops on CSO planning methodologies and control technologies for small communities. The workshops were held in six different states, with each presentation specifically tailored to the needs of the small CSO communities of the area. Special emphasis was placed on CSO control approaches for communities with a population of less than 10,000 residents.

Appendix N

Summary, by State, of CSO Impacted Water Body Segments from 303(d) Lists

Summary, by State, of CSO Impacted Water Body Segments from 1996 303(d) Lists

State	# Waterbodies Listed	Source Information Reported?	# Waterbodies listed as impaired due to: CSO impacts	Urban Runoff/Storm Sewer impacts
ALASKA	48	Yes		21
CALIFORNIA	540	Yes		64
CONNECTICUT	177	Yes	26	68
DELAWARE	159	Yes		
DISTRICT OF COLUMBIA (DC)	37	Yes	10	
GEORGIA	588	Yes	21	245
ILLINOIS	111	Yes	8	34
INDIANA	333	No		
IOWA	157	Yes		3
KANSAS	1,292	Yes		
KENTUCKY	153	No		
MAINE	241	Yes	16	19
MARYLAND	139	Yes		
MASSACHUSETTS	706	No		
MICHIGAN	34	Yes	4	1
MINNESOTA	152	No		
MISSOURI	53	Yes		1
NEBRASKA	45	Yes		
NEW HAMPSHIRE	91	Yes	8	6
NEW JERSEY	945	No		
NEW YORK	128	Yes	21	46
OHIO	727	No		
OREGON	869	No		
PENNSYLVANIA	565	Yes	7	23
RHODE ISLAND	78	No		
SOUTH DAKOTA	137	No		
TENNESSEE	328	Yes	10	89
VERMONT	315	Yes	4	2
VIRGINIA	113	Yes	5	26
WASHINGTON	672	No		
WEST VIRGINIA	518	Yes		4
WISCONSIN	101	No		
TOTAL	**10,552**	**21 states**	**140**	**652**

Summary, by State, of CSO Impacted Water Body Segments from 1998 303(d) Lists

State	# Waterbodies Listed	Source Information Reported?	# Waterbodies listed as impaired due to:	
			CSO impacts	Sewer impacts
ALASKA	58	Yes	1	25
CALIFORNIA	509	Yes		95
CONNECTICUT	224	Yes	20	75
DELAWARE	377	Yes		
DISTRICT OF COLUMBIA (DC)	36	Yes	11	
GEORGIA	584	Yes	17	224
ILLINOIS	738	Yes		217
INDIANA	209	No		
IOWA	157	Yes		5
KANSAS	1,107	No		
KENTUCKY	231	No		
MAINE	228	Yes	1	
MARYLAND	196	Yes		
MASSACHUSETTS	907	No		
MICHIGAN	272	No		
MINNESOTA	144	No		
MISSOURI	180	Yes		12
NEBRASKA	114	Yes		13
NEW HAMPSHIRE	226	Yes	17	8
NEW JERSEY	1,059	No		
NEW YORK	627	Yes	30	93
OHIO	882	Yes		176
OREGON	1,183	No		
PENNSYLVANIA	1,039	Yes	10	120
RHODE ISLAND	127	No		
SOUTH DAKOTA	161	No		
TENNESSEE	352	Yes	36	85
VERMONT	197	No		
VIRGINIA	883	Yes	7	56
WASHINGTON	1,317	No		
WEST VIRGINIA	722	Yes		5
WISCONSIN	552	Yes		24
TOTAL	**15,598**	**32 states**	**150**	**1,233**

Appendix O

Summary of State Inspection Programs

Summary of State Inspection Programs

State	Number of Facilities Inspected	Frequency of Inspections	Cause of Inspection	Contact with Region	Guidance	Checklist	Tracking	Training
AK	1 CSO-Inspections are conducted by Region 10							
CA	Not Documented	Annual	Planned	Not scheduled, but regular	Protocol	No	PCS	State inspector and operator training
CT	Not Documented							
DE	1 CSO (Region 3)	No information	NPDES	Monthly	No	No	PCS	Developing inspector training
GA	Not Documented	Annual	CSO, scheduled plan, citizen complaint	Quarterly, some emergency meetings	Permit outline	No	PCS	State inspector training
IA	3 CSOs (by Region 7)	Annual for majors	NPDES scheduled plan, citizen complaint	Annual audit	No	No	State matrix and PCS	EPA inspector training, State operator certification
IL	36 CSOs	3 to 4 years for majors	DWO, citizen complaints, monthly report discrepancy	Quarterly	State plan	Regional and State CSO checklists	PCS	Coordinating with Region 5 for inspector training, State operator training
IN	Must inspect 90 facilities per year	Annual	Annual review, DWO, schedule	Quarterly	Indiana uses the checklist as guidance	State CSO checklists	PCS	No
KS	Not Documented							
KY	4 CSOs (by Region 4)	Annual	NPDES, schedule, citizen complaint	Annually	No	No	PCS	Operator training
ME	Not Documented	No recent Maine inspections	Annual permittee report	Quarterly	Forms for annual report, Guidance in development	No	PCS and state matrix	State inspector training
MD	Not Documented							
MA	4 CSOs	Annual	NPDES, citizen complaint, DWO	Quarterly	No	No	PCS and State matrix and tracking sheet	State operator certification
MI	Not Documented	Annual for majors	NPDES, response to a problem	Quarterly	State Guidance	No	PCS and State database	State operator training
MN	Not documented	Annual for majors, 5 years for minors	In the process of separating	Quarterly	No	Being redeveloped	PCS and State database	On-the-job inspector training, internal
MO	4 CSOs (by Region 7)	Not Documented						
NE	Not documented	Annual for majors, 5 years for minors	NPDES (CSOs are not yet permitted)	Quarterly	Under development	Under development	PCS	EPA training of inspectors

State	Number of Facilities Inspected	Frequency of Inspections	Cause of Inspection	Contact with Region	Guidance	Checklist	Tracking	Training
NH	Not documented	Annual to biannual	NPDES	Quarterly	Under development	No	PCS	State operator training
NJ	Not Documented	Annual	NPDES, citizen complaint, enforcement support, non-compliance	Quarterly	National manual, developing State manual	Redeveloping CSO checklist	PCS	On-the-job inspector training, State operator certification
NY	3 CSOs	Annual	NPDES, enforcement support, part of a wet weather plan	Quarterly	State Technical and Operational Guidance Series (TOGS)	No	PCS and state matrix	State training for operators and inspectors
OH	2 CSOs (by Region 5)	Annual for majors, 3 years for minors	NPDES, protocol for response to violation	Quarterly	State protocol	Regional CSO checklists	PCS	Coordinating with Region 5 for inspector training
OR	Not Documented	Annual	NPDES, monitors in outfalls	As needed	Not Documented	No	PCS	State inspector training and operator certification
PA	Not Documented	Annual for majors, 3 years for minors	Schedule, citizen complaint, DWO	Quarterly	State Compliance & Enforcement Strategy, State manual	No	PCS and State matrix: eFACTS	State training for inspectors, may join Region 3 inspector training
RI	Not Documented							
SD	Not Documented	Biannual	NPDES, schedule, citizen complaint	Not scheduled, but regular contact	Not Documented	Checklist for NPDES inspection	PCS	EPA inspector training and on-the-job inspector training
TN	Not documented	Annual for majors, biannual for minors	CSO		No	No	PCS	State operator training
VT	Not documented	Annual	NPDES, schedule	Quarterly	National Manual	No	PCS	On-the-job inspector training
VA	Not documented	Annual for majors	NPDES	Quarterly	Strategy	No	PCS	Annual State inspector training, operator training
WA	Not documented	Biannual	NPDES, enforcement action	Infrequent	EPA manual	No	PCS and State matrix	State operator certification
WI	5 CSOs (by Region 5)	Not documented						
WV	2 CSOs (joint Region and State)	Not documented	CSO, knowledge of problem	Quarterly	Region 3 Guidance on CSOs	No	PCS and state matrix	State inspector training and operator certification

Appendix P

Summary of CSO-Related Enforcement Actions Initiated By States After Issuance of the CSO Control Policy

Appendix P–1. Summary of State Enforcement Activities Through June 2001

State	Number of CSO Enforcement Actions to Date	CSO Enforcement Action(s)	Reasons for CSO Enforcement Actions	Remarks
AK	Not Documented			
CA	1	Cease and Desist Order (CDO) to Sacramento	Violations of state water quality provisions due directly to combined sewer overflows.	RWQCB has initiated Sacramento's pre CSO Policy planning efforts and eventually led to the development and implementation of its LTCP.
CT	Not Documented			
DE	Not Documented			Two CSO communities in the state: one is using sewer separation; the other is scheduled to be completed during 2001.
DC	Not Documented			
GA	Not Documented	City of Atlanta is under a CSO-related Federal Consent Decree	Lawsuit in district court.	State of Georgia, Region 4, and Federal District Judge all have some degree of authority over the Atlanta CSO program. GAEPD and Region 4 have joint review authority for Atlanta's LTCP.
IL	1			IEPA does not have authority to administer Administrative Orders .
IN	14	Seven communities received warnings for noncompliance in 2000	Failure to develop their Operational Plan, Stream Reach Characterization and Evaluation Report, or both.	Two communities expected to be referred in 2001; five others already have been referred to enforcement .
IA	Not Documented			
KS	Not Documented			
KY	Not Documented			Only NPDES permits are used to enforce NMC and LTCP
ME	3 initiated by DEP; 9 initiated by Region 1	Consent Decrees (DEP)	Failure to comply with terms of state water-discharge licenses.	Region 1 maintained CSO Control Policy Enforcement Authority through December 2000; Consent decrees are CSO related (DEP).
MD	Not Documented			MDE is attempting to negotiate consent decrees with five communities currently under administrative orders for failing to develop an LTCP.
MA	Not Documented	Consent Degrees, Executive Orders, or Administrative Orders	Noncompliance with the water-quality standards in NPDES permit resulting from failure to implement NMC.	The Region 1 Water Enforcement Program coordinates with CSO communities to develop a program for developing and implementing an LTCP; the program is formalized in a schedule within an Order.

Summary of State Enforcement Activities Through June 2001— Continued

State	Number of CSO Enforcement Actions to Date	CSO Enforcement Action(s)	Reasons for CSO Enforcement Actions	Remarks
MI	Not Documented	Director's Final Orders (DFO); litigation and Consent Orders	To develop and implement an LTCP (DFO); Rouge River Watershed (Litigation and Consent Orders).	Region 5 and the federal district court also actively review progress in the Rouge River CSO program.
MN	Not Documented			Minnesota is actively involved in a sewer-separation program for CSO control.
MO	Not Documented			
NE	Not Documented			
NH	Not Documented			Many of the enforcement actions require submission of the required
NY	Not Documented	NPDES permits (September 27, 1988); Order on Consent (June 25, 1992); Amended Consent Judgement (ACJ) for Onondaga County; Enforcement Orders	Address CSO abatement through Facility Planning Programs for nine segments in New York City (NPDES permit); Noncompliance with 1988 NPDES permit (Order on Consent); require the implementation of an LTCP (ACJ); POTW violations (Enforcement Orders)	The 1992 Order on Consent established a 14-year compliance schedule intended to facilitate the planning, design, and construction of CSO abatement and storage facilities; POTW violations traced to the wet weather impacts the CSO is having on the operation of the POTW.
OH	Not documented	Judicial Consent Orders; Administrative Orders	Not Documented	When an enforcement action is brought in Ohio, the complete NPDES permit, including CSO provisions, is examined; Region 5 has joined OEPA in initiating enforcement actions against Youngstown and Toledo.
OR	3	Not Documented	Reduce CSOs.	Enforcement Responses: One CSO community has constructed additional treatment facilities; two communities are in the process of constructing additional treatment facilities.
PA	Not Documented	Informal enforcement notices of violation and noncompliance issued by the Southwest Regional PADEP	Not Documented	Region 3 indicates that permits that are not in compliance, as per the schedule listed in an expiring NPDES permit, should be brought into compliance through an enforcement action, rather than reissued with a new or revised schedule.
RI	Not Documented			
SD	Not Documented			South Dakota's one CSO community has chosen sewer separation as its primary CSO control tool.

Summary of State Enforcement Activities Through June 2001— Continued

State	Number of CSO Enforcement Actions to Date	CSO Enforcement Action(s)	Reasons for CSO Enforcement Actions	Remarks
TN	Not Documented			
VT	Not Documented	Administrative orders; Consent orders	To facilitate implementation of CSO controls (Administrative Orders); violation of the Administrative Order (Consent Order).	The town of Randolph has been issued a second administrative order because sewer separation project did not completely eliminated all CSO discharges for the design flow.
VA	Not Documented			
WA	Not Documented			Region 10 has administrative oversight.
WI	Not Documented			
WV	Not Documented			

Appendix P–2. Civil Judicial Actions Taken by States After the Issuance of the CSO Control Policy

Region	State	Case Name/City Name	Outcome
2	NY	Syracuse Metro WWTP	Amended consent judgement requires LTCP; NYSDEC BMPs 8-12.

Appendix P–3. Administrative Actions Taken by State After the Issuance of the CSO Control Policy

Region	State	Case Name/City Name	Outcome
1	CT	Bridgeport (East)	Administrative order by state to develop LTCP.
1	CT	Bridgeport (West)	Administrative order by state to develop LTCP.
1	CT	Derby	Administrative order by state to develop LTCP.
1	CT	Enfield WPCF	Administrative consent order required NMC.
1	CT	Hartford	Administrative order by state to develop LTCP.
1	CT	Jewett City	Administrative order by state to develop LTCP.
1	CT	Middletown WPCF	Administrative consent order required NMC.
1	CT	New Haven East Shore WPCF	Administrative order by state to develop LTCP.
1	CT	Norwalk	Administrative order by state to develop LTCP.
1	CT	Norwich	Administrative order by state to develop LTCP.
1	CT	Portland	Administrative order by state to develop LTCP.
1	CT	Shelton	Administrative order by state to develop LTCP.
1	CT	Waterbury WPCF	Administrative consent order required NMC.
1	ME	Augusta	Administrative order for CSO abatement schedule.
1	ME	Bath	Administrative order to develop LTCP.
1	ME	Biddeford	Administrative order 04/22/94 required CSO abatement schedule.
1	ME	Boothbay Harbor	Administrative consent order.
1	ME	Brewer	Administrative consent order.
1	ME	Bucksport	Administrative order to develop LTCP.
1	ME	Saco	Administrative order to develop LTCP.

Administrative Actions Taken by State After the Issuance of the CSO Control Policy—Continued

Region	State	Case Name/City Name	Outcome
1	ME	Westbrook	Administrative order to develop LTCP.
1	RI	Narragansett Bay Commission	Administrative consent order.
1	VT	Burlington Main WWTF	Administrative consent order required LTCP and compliance schedule.
1	VT	Burlington North End WWTP	Administrative consent order required LTCP and compliance schedule.
1	VT	Enosburg Falls WWTF	Administrative consent order required LTCP.
1	VT	Ludlow	Administrative order required LTCP and compliance schedule.
1	VT	Lyndon	State administrative order required NMC and LTCP.
1	VT	Newport	Administrative order required LTCP and compliance schedule.
1	VT	Richford WWTF	Administrative consent order for NMC and LTCP.
1	VT	Rutland City	Administrative compliance order (8/8/94) required NMC and LTCP.
1	VT	St. Johnsbury	Administrative order required NMC and LTCP.
1	VT	Swanton	Administrative order required NMC and LTCP.
1	VT	Winooski	Administrative consent order.
2	NY	NYCDEP	1995 amendment to 06/24/92 consent order required mapping, inspection, & O&M of CSOs.
2	NJ	Perth Amboy	Administrative consent order for NMC.
2	NY	Auburn STP	Administrative order required NYSDEC BMPs 8-10.
2	NY	Binghamton CSO	Consent order.
2	NY	Binghamton-Johnson City Joint WWTF	Consent order.
2	NY	Newtown Creek WPCP	Consent order.
2	NY	North River WPCF	Consent order for NYSDEC BMPs 8 and 9.

Administrative Actions Taken by State After the Issuance of the CSO Control Policy—Continued

Region	State	Case Name/City Name	Outcome
2	NY	NYCDEP 26th Ward	Consent order.
2	NY	NYCDEP Bowery Bay WPCP	Consent order for NYSDEC BMPs 8 and 9.
2	NY	NYCDEP Coney Island WPCP	Consent order for NYSDEC BMPs 8 and 9.
2	NY	NYCDEP Jamaica WPCP	Consent order for NYSDEC BMPs 8-12.
2	NY	NYCDEP Oakwood Beach WPCP	Consent order for NYSDEC BMPs 8 and 9.
2	NY	NYCDEP Owls Head WPCP	Consent order for NYSDEC BMPs 8 and 9.
2	NY	NYCDEP Rockaway WWTP	Consent order for NYSDEC BMPs 8 and 9.
2	NY	NYCDEP-Hunt's Point WPCP	Consent order for NYSDEC BMPs 8 and 9.
2	NY	Port Richmond WPCF	Consent order for NYSDEC BMPs 8 and 9.
2	NY	Red Hook WPCP	Consent order for NYSDEC BMPs 8 and 9.
2	NY	Tallman Island WPCP	Consent order for NYSDEC BMPs 8 and 9.
2	NY	Village of Johnson City CSO	Consent order.
2	NY	Ward Island WPCP	Consent order for NYSDEC BMPs 8-12 and floatables control.
3	PA	City of Monongahela	PADEP consent order 01/31/00 required separation/construction of new sewer and planning.
3	VA	City of Lynchburg	Administrative order requiring NMC and LTCP.
3	VA	City of Richmond	Administrative order requiring NMC and LTCP.
3	WV	City of Belington	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Benwood	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Farmington	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Follansbee	Administrative order (4/30/99) required LTCP by 1/1/2002.

Administrative Actions Taken by State After the Issuance of the CSO Control Policy—Continued

Region	State	Case Name/City Name	Outcome
3	WV	City of Hinton	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Kenova	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Kingwood	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Logan	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Marlinton	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of McMechen	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Montgomery	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Moorefield	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Mullens	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Nutter Fort	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Parsons	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Philippi	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Point Pleasant	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Richwood	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Shinnston	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Sistersville	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Smithers	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Thomas	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	City of Westover	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	Danville Public Service District	Administrative order (4/30/99) required LTCP by 1/1/2002.

Administrative Actions Taken by State After the Issuance of the CSO Control Policy—Continued

Region	State	Case Name/City Name	Outcome
3	WV	Flatwoods-Canoe Run Public Service District	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	Greater Paw Paw Sanitary District	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	Town of Barrackville	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	Town of Bethany	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	Town of Cedar Grove	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	Town of Davis	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	Town of Marmet	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	Town of Monongah	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	Town of Petersburg	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	Town of Terra Alta	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	Town of West Union	Administrative order (4/30/99) required LTCP by 1/1/2002.
3	WV	Town of Winfield	Administrative order (4/30/99) required LTCP by 1/1/2002.

Appendix P–4. Other Actions Taken by States

Region	State	Case Name/City Name	Outcome
1	VT	Barton WWTF	Administrative consent order required LTCP and compliance schedule.
1	VT	Brandon WWTP	Administrative consent order required LTCP and compliance schedule.
1	VT	Hardwick WWTP	Administrative consent order required LTCP and compliance schedule.
1	VT	Lundenburg Five District #2 WWTF	Administrative consent order required LTCP and compliance schedule.
1	VT	Montpelier WWTF	Administrative consent order required LTCP, separation, and schedule.
1	VT	Northfield WWTF	Administrative consent order required LTCP and compliance schedule.
1	VT	Randolph WWTF	Administrative consent order for NMC and LTCP.
1	VT	Springfield WWTF	Administrative consent order required LTCP and compliance schedule.
1	VT	St. Albans WWTF	Administrative consent order required LTCP.
1	VT	Vergennes WWTF	Administrative consent order for elimination of CSOs.
1	VT	Wilmington WWTF	Administrative consent order required LTCP and compliance schedule.
1	VT	Windsor Main WWTF	Administrative consent order required LTCP and compliance schedule.
3	MD	Allegany County CSOs	Administrative consent order required LTCP; will separate.
3	MD	Cambridge WWTP	Administrative consent order required LTCP; will separate.
3	MD	Cumberland WWTP	Administrative consent order required LTCP.
3	MD	Frostburg CSOs	Administrative consent order required LTCP; will separate.
3	MD	LaVale CSOs	Administrative consent order required LTCP; will separate.
3	MD	Patapsco WWTP	Administrative consent order required LTCP; will separate.
3	MD	Salisbury WWTP	Compliance order (5/15/97) required NMC and LTCP.
3	MD	Westernport Town	Administrative consent order required LTCP.

Other Actions Taken by States—Continued

Region	State	Case Name/City Name	Outcome
3	PA	Berwick Area Joint Sewer Authority	Compliance order required NMC and LTCP.
3	PA	Coal Township	Compliance order required NMC and LTCP.
3	PA	Harrisburg Authority	Action required NMC.
3	PA	Shamokin City	Compliance order required NMC and LTCP.
4	GA	Columbus CSO	Administrative consent order required LTCP.
4	TN	Chattanooga	Administrative consent order for elimination of CSOs.
4	TN	Clarksville	Administrative consent order (3/22/1990) required LTCP.
4	TN	Nashville	ACO (3/30/1990) required CSO abatement measures by 2001.
5	IN	City of Fort Wayne WWTP	Administrative order for NMC and LTCP.
5	IN	City of Madison WWTP	Consent decree for NMC and LTCP.
5	IN	Hammond WWTP	Consent decree for NMC and LTCP.
5	MI	Grosse Pointe Farms CSO	Required LTCP and sewer separation.
5	MI	Grosse Pointe Park CSO	Compliance order required LTCP and outfall removal.
5	MI	River Rouge CSO	1994 CO required LTCP.
5	OH	City of Fostoria	Compliance order (8/24/93) required LTCP.
5	OH	City of Girard WWTP	Compliance order required NMC and LTCP.
5	OH	City of Sandusky	Compliance order required NMC and LTCP.
5	OH	Eastern Ohio Regional Wastewater Authority	Compliance Order required NMC and LTCP.
5	OH	Port Clinton	Consent Decree for NMC and LTCP.

Other Actions Taken by States—Continued

Region	State	Case Name/City Name	Outcome
5	OH	Steubenville	Compliance order required NMC and LTCP.
5	OH	Toledo	Administrative consent order (6/28/99) required LTCP.
5	OH	Van Wert	Consent Decree for NMC and LTCP.
5	OH	Village of Continental	Compliance order required LTCP.
7	MO	Sedalia North WWTP	Compliance order for NMC; will eliminate or treat CSOs.
10	OR	City of Astoria WWTP	S&FO (1/7/93) eliminated CSOs that violate WQS.
10	OR	City of Corvallis WWRP	S&FO required LTCP.
10	OR	City of Portland Columbia Blvd WWTP	S&FO (8/91) with penalties; Amended S&FO (8/94).

Appendix Q

Sample State Information Management Systems Used to Track Requirements for CSO Control

Sample Information Management System: Indiana Department of Environmental Management CSO Website

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IDEM Back to IDEM Home

Office of Water Quality
Indiana Department of Environmental Management

Report Environmental Emergencies

Featured Offices
Air • Land • Water
Pollution Prevention & Technical Assistance

About OWQ
Assistance
Browse OWQ Topics
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Data Sources
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Rules & Laws
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Combined Sewer Overflow

The Combined Sewer Overflow Group augments the NPDES Municipal permitting program by implementing a strategy for the maintenance and management of combined sewer collection systems. The primary objective of this group is to insure the minimization of impacts to waters of the state from combined sewer overflows (CSOs).

CSO Long Term Control Plan and Use Attainability Analysis Guidance

CSO Tracking (pdf) or (html) formats) - Updated January 8, 2001

Final Combined Sewer Overflow (CSO) Strategy [pdf]

Indiana CSO Background Information

CSO Public Notification Focus Workgroup

Senate Enrolled Act No. 431 [pdf]

CSO Discharge Monitoring Report (DMR) Forms and Instructions*

Instruction Letter [pdf]
Example Form** [pdf]

Frequently Asked Questions (FAQ) about the new CSO DMR [pdf]

CSO DMR Form - Page 1 [pdf]
CSO DMR Form - Additional Outfalls [pdf]

* The CSO DMR forms are also available in Excel and Quattro Pro formats via email request. Please submit an email request to Lynn Riddle to receive the forms. However, it must be noted that **CSO DMRs may not be submitted electronically**.

**The data and parameters shown on this document are for an example form only and do not necessarily reflect all of the required parameters and limitations on your NPDES permit.

Links EXIT IDEM

City of Indianapolis: Planning to Control Sewage Overflows
CSO Partnership Homepage
EPA Office of Water - CSO Policy/Guidelines
40 CFR Part 122 [FRL -] CSO Control Policy

Page URL: file://P:/Epa2001/Report_to_Congress/Appendices/final%20draft/TMP1010690722.htm
Updated: Wednesday, 09-Jan-2002 13:03:07 EST

Sample Information Management System: Massachusetts

CSO Permittee	Number	Permit Date	Outfalls	Receiving Waters	NMC Submitted	Enforc. Type	Date	Long-Term Submitted	Plan Approved	Comments/Status	DEP Contact
Agawam	MA0101320	9/29/1995	12	Westfield River Connecticut River	12/23/1997	AO	12/30/1996			Proceeding with separation. Inspections needed to confirm status	Kurt Boisjolie (413) 755-2284
BWSC (MWRA)	MA010119	9/29/1987	53	Boston Harbor & tributaries	Jan-97	CO	(MWRA)	MWRA Plan		Proceeding with Separation, storage throughout CSO area pursuant to MWRA CSO Facilities Plan	Kevin Brander (978) 661-7770
Cambridge	MA010197	3/26/1993	13	Charles River Alewife Brook	1/30/1997	CO	(MWRA)	MWRA Plan		Proceeding with Separation pursuant to MWRA CSO Facilities Plan re-evaluating CSO alternatives in Alewife area	Kevin Brander (978) 661-7770
Chelsea	MA010187	3/23/1993	5	Mystic River Chelsea Creek	Jan-97	CO	(MWRA)	MWRA Plan		Proceeding with Separation and Hydraulic Relief pursuant to MWRA CSO Facilities Plan	Kevin Brander (978) 661-7770
Chicopee	MA0101508	9/29/1995	40	Chicopee River Connecticut River	12/17/1996	AO	6/3/1999			in planning phase -Scope approved DLTCP now due June 30, 2001	Kurt Boisjolie (413) 755-2284
Fall River	MA010038	12/7/2000	19	Mount Hope Bay Taunton River Quequechan River	?	CO	?	Jul-99 (LTCP Revision)		Deep Tunnel Storage moving forward July 1999 report recommends revision to 1992 plan (under review)	Dave Burns (508) 946-2738
Fitchburg	MA010098	9/30/1992	27	Nashua River	11/20/1996	AO	7/9/1996	Jan-99 DLTCP		Draft Plan and Sewer Separation Study submitted. More work needed	Bob Kimball (508) 792-7650
Gloucester	MA010062	6/26/1985	4	Gloucester Harbor	2/1/2000	CD	10/8/1991	5/1/1992 CSO FP	9/28/1992	City re-evaluation sewer separation Report Due 4/2001	Kevin Brander (978) 661-7770
GLSD	MA010044		4	Merrimack River Spicket River	Nov-98	AO	6/25/1999			Planning underway Draft LTCP due 7/31/01	Kevin Brander (978) 661-7770
Haverhill	MA010162		23	Merrimack River Little River	Sep-96	AO	8/9/1999	Sep-00 DLTCP		Phase II Planning underway DLTCP due 1/15/01	Kevin Brander (978) 661-7770
Holyoke	MA0101630	9/29/1995	15	Connecticut River	1/10/1997	AO	12/12/2000	5/31/2000 DLTCP		Planning extension granted City evaluating DBO procurement DLTCP submitted 5/31/00	Kurt Boisjolie (413) 755-2284
Lowell	MA010063	8/14/1997	9	Merrimack River Concord River	Apr-98	CD	11/10/1988	1990 CSO FP		Schedule modification requested to establish date for DLTCP of 7/1/01	Kevin Brander (978) 661-7770
Ludlow	MA0101338	8/26/1985	5	Chicopee River	?	AO	12/30/1996			Separation moving forward. One outfall remaining. City received SRF loan to complete planning.	Kurt Boisjolie (413) 755-2284
Lynn	MA010055		4	Lynn Harbor Stacy Brook, Saugus River	?	CD	2/1/2001	10/2/2000 NPC/FP		City to implement complete sewer separation. Discharges to King's Beach will be eliminated by 12/04, all CSOs eliminated by 12/09	Kevin Brander (978) 661-7770
Montague	MA010013	9/29/1995	3	Connecticut River	?	?	?			Sewer separation work done. Town has received SRF loan for further LTCP work.	Kurt Boisjolie (413) 755-2284
MWRA	MA010235	7/5/2000	7	Boston Harbor Charles, Mystic Rivers	Jan-97	CO	8/31/1998 (schedule six)	7/31/1997	10/31/1997	Plan being implemented. Variances issued in the Charles and Mystic Basins. Work will continue to 2010.	Kevin Brander (978) 661-7770
New Bedford	MA0100781	11/2/2000	38	Buzzard's Bay Clark's Cove Acushnet River	Jan-97	CD	?	1991 CSO FP		much separation work done. City to submit scope for reassessment of 1991 plan.	Jeff Gould (508) 946-2757
Palmer	MA0101168	11/29/2000	21	Quabog River Swift River Ware River	Dec-98	AO	12/30/1996	7/6/1999 FLTCP		Plan for Sewer Separation approved and being implemented. SRF funding obtained.	Kurt Boisjolie (413) 755-2284
Somerville	MA010198	9/29/1992	12	Mystic River Alewife Brook	12/31/1996	CO	(MWRA)	MWRA Plan		partial sewer separation being implemented pursuant to MWRA plan	Kevin Brander (978) 661-7770
South Hadley	MA0100455	10/10/1995	11	Connecticut River Buttery Brook Stony Brook	12/31/1996	AO	?			implementing sewer separation. 4 outfalls remain. AO schedule needs modification.	Kurt Boisjolie (413) 755-2284
Springfield	MA0103331	4/14/1997	32	Connecticut River Chicopee River & Mill River	Apr-97	AO	11/15/2000	3/31/2000 DLTCP		DLTCP submitted 3/31/00 Phase I program moving forward. FLTCP due March 2002	Kurt Boisjolie (413) 755-2284
Taunton	MA0100897	1/9/2001	1	Taunton River	12/26/1996	AO	?			Assessment Report needed.	Jeff Gould (508) 946-2757
West Springfield	MA0101389	9/28/1995	6	Connecticut River Westfield River	12/23/1996	AO	9/8/1995			Separation being implemented. One CSO remaining.	Kurt Boisjolie (413) 755-2284
Worcester	MA0102997	11/8/1990	1	Mill Brook	2/3/1997	AO	9/19/2000 ?			Scope approved for final planning work. $54 million in CSO abatement work already completed	Ning Chen (508) 792-7650

Appendix S

GPRACSO Model Documentation

Documentation for the GPRACSO Model and Database

How the GPRACSO Model and Data Base Work

The GPRACSO model estimates the volume of overflow and pollutant loadings for communities with combined sewer systems. To accomplish this, the model estimates the amount of wet weather flows that would be directed to a publically owned treatment works (POTWs), and based on existing dry weather flows, estimates the volumes that become combined sewer overflows (CSOs). Hour-by-hour estimates of biochemical oxygen demand (BOD) concentration within the combined sewer system are used to estimate the pollutant loadings in overflows and treated effluent from POTWs.

Wet-weather management algorithms within the model permit the user to estimate the management levels necessary to reach a specified system-wide treatment level (e.g., 85 percent treatment of wet-weather flows). The management target may be reached through a combination of POTW and end-of-pipe treatment, or through wet-weather storage. The GPRACSO model will also estimate the effectiveness of secondary treatment bypass at POTWs with recombination of bypass flows, optimizing the system such that the target monthly discharge concentration in effluent does not exceed a permit level (e.g., 30 mg/L of BOD).

The key model outputs include wet-weather and dry weather BOD loadings (or other pollutants) and discharge for each hour in the typical rainfall year. The model output can be summarized weekly, monthly, or annually for individual sewersheds or individual communities. The algorithms in the GPRACSO model can operate at multiple system scales. The only thing that establishes the scale of the application is the data that is used to drive the GPRACSO model. Example system scales are the following:

- Simulating multiple separate sewersheds served by a single conveyance/treatment system
- Simulating multiple combined sewers communities within a single watershed that have separate conveyance/treatment systems
- Simulating all combined sewer communities in the nation

In estimating overflow volume, each individual combined sewer community is represented as a specified land acreage generating a known quantity of dry weather flow and served by a known quantity of treatment (wet- and dry weather) and wet-weather storage. For the "typical" rainfall year (pulled from long-term meteorologic records for each combined sewer community in the nation) each hour's rainfall and temperature is evaluated to determine if runoff occurs and then if overflow occurs.

The interaction between the GPRACSO model and data base is analogous to an automobile where the model is the engine and the data base provides the fuel. The GPRACSO data base was constructed by EPA to facilitate national assessment of CSO issues, and as such contains National data on combined sewer systems. The GPRACSO data base contains system data that represents:

- Individual combined sewer communities, where individual systems are stand alone elements and do not exist as a part of a larger regional sewer system
- Regional combined sewer communities, commonly encountered near large and well-established cities.

Wherever multiple combined sewer communities comprise a single regional system, the individual combined sewer communities are condensed into a single data record within the GPRACSO data base representing the combination of related combined sewer communities-totaling treatment capacity, wet-weather storage, and combined sewer service area. A "combined sewer community" is used to generically refer to the entity (or data record in the GPRACSO data base) analyzed, whether it is an individual sewer system or a totaled regional system. The GPRACSO model can evaluate all data records (approximately 700 combined sewer communities) in the GPRACSO data base every time the model is "run," or analyze a single combined sewer community.

The GPRACSO data base consists of data from EPA Clean Water Needs Survey from 1992 and 1996, EPA's CSO data base, long-term control plans (LTCPs), and Internet searches to identify most combined sewer community systems and identify interconnected combined sewer community networks served by regional POTWs. In addition, for approximately 15 percent of the combined sewer communities recent data has been obtained through a review of state NPDES permit records performed in the summer of 2001. The GPRACSO data base contains information on how the Clean Water Needs Facility numbers relate to combined sewer community names and NPDES numbers, and how complex combined sewer community systems connect to discharge into single regional POTWs. For highly detailed assessments of the impacts of a single combined sewer community, the GPRACSO data base may not have accurate information, but for EPA's efforts to summarize national conditions and assess policy options, the combination of the GPRACSO data base and the GPRACSO model is sufficiently accurate.

The following sections provide a brief overview of the GPRACSO model algorithms and the key assumptions it makes.

Simulating Dry weather Sanitary Flows

Average daily combined sewer community sanitary flows are based on discharge monitoring reports submitted to the Permit Compliance System (PCS). Flow peaking factors are used to represent the hourly variation of sanitary flows about the average flow rate, within the combined sewer system and then entering the POTW (Metcalf & Eddy, 1991). For example, the typical minimum and maximum inflows are 32 percent and 141 percent of the average reported POTW inflow. Wherever data is available for a combined sewer community on both average and maximum POTW capacity, peaking factors were modified to account for this data.

Regardless of the conditions encountered, simulated average dry weather inflow into a POTW always matches the average inflow obtained from the best available source for each combined sewer community. In addition, the maximum daily inflow never exceeds the reported maximum POTW treatment capacity.

Hourly Dry weather Sanitary BOD Concentration Variation

In its current form, the GPRACSO model only analyses BOD pollutant loadings for dry weather and wet-weather conditions. While the algorithm can be used to evaluate any pollutant, EPA established that BOD should be used as the indicator pollutant in assessing national impacts of CSO management.

The GPRACSO model assumes that the average dry weather BOD concentration entering the POTW is 158 mg/L, with minimum and maximum hourly values of 40 and 290 (mg/L) respectively. The diurnal variation in BOD concentration mimics typical system trend reported by Metcalf & Eddy (1991). There were no other influences on hourly dry weather sewage concentration of BOD unless there are additions to sanitary inflows from snowmelt or from discharge from wet-weather storage facilities.

Flow source #1: GPRACSO identifies that there is a snow pack present in the combined sewer community and that hourly air temperature is above 32 degrees.

Model Response	*Assumptions*
From the calculated melt rate, an estimate of the snowmelt is made, all of which is assumed to flow in to the combined sewer system. The relative volumes of dry weather sewage and snowmelt is used to calculate a reduction in the BOD concentration entering the POTW.	It is assumed that snowmelt contains zero pollutant and as a result dilutes the inflow entering the POTW.

Flow source #2: A combined sewer community has dedicated wet-weather storage available to capture any wet-weather flows in excess of the POTW maximum treatment capacity.

Model Response	*Assumptions*
The GPRACSO model tracks on an hourly basis all of the storage volume along with the amount of pollutant (BOD) it contains.	GPRACSO assumes that the stored flow is discharged to the POTW as soon as there is available treatment capacity (i.e., the hourly POTW inflow is less than the reported maximum POTW treatment capacity).

Estimation of Overflow Volume

The GPRACSO model performs many hydrologic computations as it evaluates the potential and actual wet-weather inflow into the combined sewer community system. The data sources used and the computations performed are as follows.

Typical meteorologic data was obtained for each combined sewer community based on a review of long-term data from the National Weather Service (NWS). First, the combined sewer communities were geographically grouped based on hydrology into 84 common zones. Next, a typical rainfall year was identified for each zone. As a rule, the typical year contained within +/-10 percent of the annual average precipitation and has no single rainfall event larger than the two-year return period rainfall. Depending on zone evaluated, the typical rainfall year presents between 30 and 80 possible overflow events for combined sewer communities within the zone. The associated hourly temperature record was also retrieved from NWS records such that snow generation and melting could be assessed during the GPRACSO simulation.

Runoff Estimation was performed using the rational method, which multiplies hourly rainfall by a single coefficient to calculate the runoff depth. The coefficient was set to equal the overall impervious fraction of each combined sewer community. Land use/land cover GIS layers from USGS were used to help estimate the geographically weighted imperviousness for the land area found within the political boundaries of the CSS communities (EPA, 1998).

Snowfall accumulation and melting was calculated using a degree-day approach applied on a hourly basis (McCuen, 1989). Each hour's temperature was evaluated to establish the potential snowmelt, and then snowmelt was simulated if a snowpack existed. The GPRACSO model monitors the conditions in each combined sewer community to determine if snowpack is present and if it is aggregating or shrinking in any simulated hour.

POTW wet-weather treatment estimation. The GPRACSO simulation assumes POTW secondary treatment capacity above the simulated hourly dry weather inflow (the average POTW inflow multiplied by the appropriate hourly peaking factor) is available for treating potential overflows. The GPRACSO model assumes that ***any*** inflow, up to the POTW's maximum treatment rate, is discharged from the POTW at a concentration 87 percent less than the inflow concentration. The assumption is that POTWs provide a secondary level of treatment for all flows treated during either wet- or dry-conditions. This treatment assumption works out to an average discharge concentration under dry weather conditions of approximately 26 mg/L BOD, post-POTW treatment.

Information is available on the average and maximum flows for many POTWs in discharge monitoring reports found in PCS. Using monthly reported values, the GPRACSO model sets the simulated average POTW inflow to the average reported inflow rate, and sets the maximum (simulated) wet weather treatment capacity to the peak or maximum reported POTW discharge. When examining future conditions, the year 2000 flows are used. For historic conditions, the appropriate discharge monitoring report (DMR) reports are accessed and used to look back at management performance.

POTW secondary treatment bypass provides partial treatment (to a primary treatment level) for any flows in excess of the POTW's maximum secondary capacity. Actual combined sewer community bypass can be evaluated using the GPRACSO model if facility-specific information is added to the GPRACSO data base. For bypass flows, BOD inflow concentrations are assumed to be reduced 25 percent by the primary treatment. Bypass is only possible after all wet weather storage has been used during a wet weather event.

Wet weather end-of-pipe (EOP) treatment estimation. EOP treatment occurs only after both the maximum capacity of the POTW and the wet weather storage is fully utilized during an overflow period. The GPRACSO model uses EOP as a last resort treatment, and it cannot be used to drain stored overflows. EOP treatment is assumed to reduce influent BOD concentrations by 25 percent.

Wet weather storage simulation. The GPRACSO model has built-in algorithms for assessing the operations of wet weather storage facilities designed to capture and hold potential overflow volumes until treatment capacity is available. The operation on wet weather storage is simulated such that any hourly flows in excess of POTW treatment would go directly to wet weather storage. Only after all available wet weather storage is filled and EOP/bypass capacity is exceeded will GPRACSO simulate/report an overflow. Available POTW capacity for draining storage is defined as the difference between the maximum POTW treatment rate and the flow entering the simulated POTW for any given hour.

Recognition of conveyance limits of combined sewer interceptor systems. The GPRACSO model assumes that the total interceptor system discharging into a POTW has a capacity greater than the maximum treatment rate of the POTW. As a result, the limiting factor in combined sewer community flow management is the POTW wet weather treatment capacity. It is acknowledged that this assumption is not appropriate for some combined sewer communities, however, maximization of flows to the POTW is a required minimum measure under EPA's CSO policy.

Estimation of Combined Sewer Community Overflow BOD Loads

The GPRACSO model attempts to recognize the major influences on combined sewer system BOD concentration in each hour that it simulates. The influences accounted for include:

- Flushing of accumulated materials in the combined sewer community pipes
- The dilution of sanitary flows by storm water inflow late in the overflow periods
- The daily variation in sanitary flow rate and concentration

The first two influences are lumped into a single load or calculation, referred to as "storm water BOD load" which is the combination of BOD flushed from pipes and BOD washed from the urban surface, independent of any sanitary inflow rates. To help estimate the BOD loadings attributable to storm water (including the flushing of settled pollutant in pipes), the following exponential relationship between time and BOD concentration was developed:

Equation 1. $C = (200 * 10^{-1.5*(t)}) + 15$

where

C = the BOD concentration in mg/L used to calculate the storm water load

t = time in hours since the overflow started

15 = the BOD concentration in mg/L assumed to be in urban storm water

Information from two data sources was used to develop the above relationship. The first data source is multi-event CSO monitoring results of first-flush concentrations in combined sewers for a medium-sized east coast combined sewer community. The second data source used to develop the relationship was from 90th percentile event mean concentration (EMC) BOD concentrations reported in the EPA Nationwide Urban Runoff Program (NURP). The first data source suggests that BOD concentrations at the very start of runoff ranges between 200 and 400 mg/L, but that BOD concentrations decrease rapidly within the first hour of runoff. As a result, the average first hour BOD concentration is set to be 215 mg/L, using the equation above. The second data source suggests a high-end long-term urban runoff BOD concentration in the absence of CSOs is approximately 15mg/L, a feature also provided by the equation above.

Calculation of hourly overflow concentration in storm water/sanitary mix. While the initial storm water inflows into the combined sewer community cause a high concentration of flush load at the beginning of the overflow period, later in the overflow period highly dilute storm water thins the more concentrated sanitary flows. As a result, the GPRACSO hourly model continuously mixes the sanitary flow/BOD load with the storm water runoff/BOD load to calculate the average hourly concentration. It is assumed that the mixing of sanitary and storm water is 100 percent complete for each hour simulated and that any overflows which occur will contain the same pollutant concentration as what enters the simulated POTW. The logic used to select the uniform concentration for any particular hour is:

If EventTime = 0 (the runoff has just started entering the CSS), then
CSCConc(ttt,0) = $(200 * 10^{-1.5*(\text{event time})}) + 15$

If EventTime > 0 (the overflow event is progressing), then
CSCConc(ttt,0) = $(200 * 10^{-1.5*(\text{event time})}) + 15$

If CSCConc(ttt,0) < DWBODconc * hours, then
CSCConc(ttt,0) = (HRDischarge(ttt,0) - HRDWF(ttt,0)) * (CSCConc(ttt,0) +
HRDWF(ttt,0) * DWBODconc * hours) / HRDischarge(ttt,0)

EventTime	= time since the start of the overflow event (hours)
CSCConc	= uniform concentration of the storm water/sanitary mixture (mg/L) from the combined sewer community
DWBODconc * hours	= the sanitary flow concentration in the absence of overflow (mg/L) for the “hour” under simulation
HRDischarge(ttt,0)	= the simulated total flow in the combined sewer (mg/d)
HRDWF(ttt,0)	= the hour’s sanitary flow rate in the absence of overflow (mg/d)

The CSCConc(ttt,0) value is used to compute the overflow pollutant load, the inflow load entering the POTW, and the pollutant load stored in any wet weather storage that may be present in the system. The assumed concentration for the first hour when overflow occurs is 215 mg/L regardless of when it occurs in the day. For any subsequent hour in which overflow can occur, the BOD concentration is the greater of (1) the value taken from Equation 1 based on the time elapsed since the start of the overflow, or (2) the flow weighted combination of Equation 1 and the sanitary flow concentration based on daily variation. The first flush is recognized as the strongest influence on concentration at the beginning of the event, the dominate role of storm water dilution is recognized later in the event, and the daily variation in sanitary flow concentration is accounted for throughout the event.

Removal efficiencies of POTW and EOP Treatments. All flows passing through POTWs are assumed to have a 87 percent reduction in the inflow BOD load; the effluent concentration would be 13 percent of the influent concentration. All flows passing through EOP treatment are assumed to have 25 percent reduction in the inflow BOD load; the effluent concentration would be 75 percent of the influent concentration. For the purpose of estimating pollutant loadings, bypassed flows are assumed to have a 25 percent reduction in inflow BOD concentration due to the primary treatment it receives.

Summary

Based on data within the GPRACSO data base, the GPRACSO model estimates combined sewer overflow volume, sanitary discharge volume, and annual BOD load for approximately 700 combined sewer communities. Designers of the GPRACSO model have attempted to estimate the annual performance expected under typical rainfall conditions based on historic POTW performance data. Recent POTW upgrades and/or new wet weather management facilities may not be incorporated within the current version of the GPRACSO data base. (Note, EPA is currently collecting data on CSS facilities which can be used to update the GPRACSO data base.) For this reason, the estimates produced by the GPRACSO simulation may not fully recognize current management. In addition, model estimates will vary from the actual overflow measured at any given community for any given year because of natural hydrologic variation.

Extensive efforts were made to account for the majority of physical and hydrologic factors encountered in the generation of sanitary and storm water flows, and the operation of wet weather treatment and storage. As a result, it is expected that the bulk of the model error originates from errors in the basic system data (e.g, the combined sewer service acreage in each CSS). Where GPRACSO results have been compared against much more detailed/sophisticated models, the results have been found to agree within +/-20 percent. When compared against annual overflow estimates based on monitoring data (available for a limited number of cities), the GPRACSO model has been found to be with +/- 20 percent. These error ranges are well within that encountered in total annual rainfall; when identifying a typical rainfall year for each CSS the total annual rainfall was found to range +/- 30 percent throughout a 30 year period. Inaccuracies related to ***mathematical*** model errors generated as the model solves internal algorithms are very small; mathematical errors are less than 0.01 percent for the volume of water and less than 0.01 percent for the mass of pollutant.