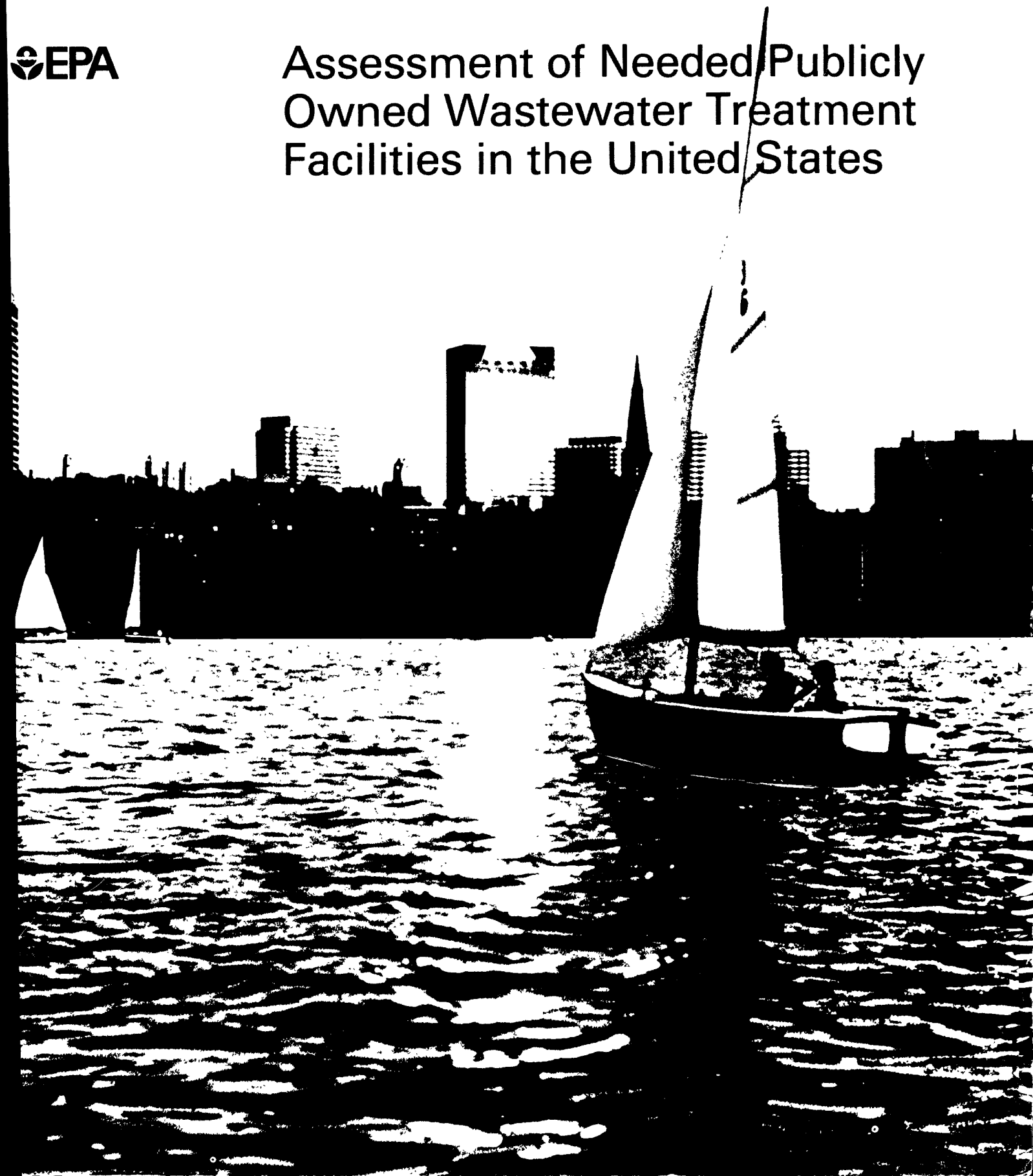


1986 Needs Survey Report to Congress



Assessment of Needed Publicly Owned Wastewater Treatment Facilities in the United States



Document is available for sale to the public through:

Dr. Howe, U.S. EPA Instruction Resource Center,
1200 Chambers Road, Columbus, Ohio 43212

National Technical Information Service,
5285 Port Royal, Springfield, Virginia 22151



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

FEB 10 1987

THE ADMINISTRATOR

Honorable George Bush
President of the Senate
Washington, D.C. 20510

Dear Mr. President:

Enclosed is the Environmental Protection Agency's (EPA) report on the "1986 Assessment of Needed Publicly Owned Wastewater Treatment Facilities in the United States," commonly known as the 1986 Needs Survey. This report is required by Sections 205(a) and 516(b)(1) of the Clean Water Act.

The 1986 Needs Survey, a joint effort by the States and EPA, assesses the capital investment required to build or improve needed municipal wastewater treatment facilities. It also includes a discussion of the needs necessary to bring facilities into compliance with their final permit limits. As in previous Needs Surveys, EPA estimates are limited to facilities that are eligible for construction grant funds, including categories eligible through the governor's discretionary authority, under Section 201(g)(1) of the Clean Water Act.

In preparing the 1986 Needs Survey, we concentrated on improving the quality of cost estimates and establishing a consistent basis for including facilities in the Survey. Only facilities with acceptable documentation of water quality or public health problems are included in EPA estimates. We have encouraged all States to submit separate estimates where they believe additional needs exist that could not satisfy the water quality/public health based documentation criteria. Twelve States submitted separate estimates which are presented in the report. We placed special emphasis on the cost estimates for facilities with the largest need to ensure that they are based on the most recent data available. I believe these efforts have substantially improved the quality of the Survey.

I would be pleased to further discuss the results of this Survey at your convenience.

Sincerely,


Lee M. Thomas

Enclosure



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

FEB 10 1987

THE ADMINISTRATOR

Honorable James C. Wright, Jr.
Speaker of the House
Washington, D.C. 20515

Dear Mr. Speaker:

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Sincerely,
A handwritten signature in black ink, appearing to read "Lee M. Thomas", written over the word "Sincerely,".

Lee M. Thomas

Enclosure

1986 Needs Survey Report to Congress

Assessment of Needed Publicly Owned Wastewater Treatment
Facilities in the United States

U.S. Environmental Protection Agency
Region V, Library
230 South Dearborn Street
Chicago, Illinois 60604

February 10, 1987

U.S. Environmental Protection Agency
Office of Municipal Pollution Control (WH-595)
Washington, D.C. 20460
Tele. (202) 382-7251

Prepared Under Contract Number 68-01-6830

U.S. Environmental Protection Agency

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Ray Kvalheim - Region II Joseph Potena, NJ Chet Feehan, NJ Mark Burdyl, NY Francine Lang, VI Tomas Rivera, PR Ava Hernandez, PR	Edwin C. Horn, Jr./ Susan George - Region V James R. Leinicke, IL Paul J. Serguta, IN Janice Tompkins, MI John E. Hensel, MN Anne Jackson, MN Orville Ball, OH Dick Kalnicky, WI	Paula Cifka - Region VIII Bill McKee, CO Diane C. Davison, MT Rod Beck, ND Terry Keller, SD Ronald Roberts, UT Jerry Placzek, WY
Thomas O. Maher - Region III Roy F. Parikh, DE Mohsin Siddique, DC Judy Marsh, MD Brij M. Garg, PA Carrie L. Chumney, VA Kent Ware, VA Rosalie Ortega, WV	Gene Wossum/ Le Young - Region VI Larry Wilson, AR Michael Vince, LA Cordelia Snow, NM Glen Jones, OK Bill Allen, TX	Mike Blum/ Diane Grosser - Region IX Ron Frey, AZ Herb Deardorff, CA Dennis Tulang, HI James B. Williams, NV Meiling Odom, CNMI Danny Collier, American Samoa/TTPI Doris Betuel, Guam
		Bryan Yim/ Kathy Veit - Region X Dick Marcum, AK Alan Stanford, ID Maggie Conley, OR Carrie Berry, WA Nancy Thompson, WA

Thanks also for their fine work to Pete Ciotoli, Joe Spollen, Ron Ragan, Bob Caprara, Mary Anne DeHaven, and the rest of the staff at Roy F. Weston, Inc., contractor for the 1986 Needs Survey.

Finally, special thanks to Charlie Bishop, Jim Leinicke, and Bryan Yim who have made enormous contributions to many past Surveys but have now gone on to contribute their hard work, insights, and dedication to other pursuits.

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Executive Summary

The 1986 Needs Survey, a joint effort between the States and EPA, was conducted to meet the requirements of Sections 205(a) and 516(b)(1) of the Clean Water Act.

The report provides the EPA's detailed estimate of the capital costs needed (i.e., "needs") to build publicly owned municipal wastewater treatment facilities to comply with the Clean Water Act.

The reliability and consistency of the Needs Survey data have been significantly improved in 1986. The EPA's needs estimates are now limited to those facilities for which a water quality or public health problem could be documented in accordance with specific established criteria. The actual cost estimates were also updated.

States submitted separate estimates for needs they believed to be authentic but did not meet the established documentation criteria.

The needs for documented facilities are:

- \$76.2 billion to satisfy all categories of need for the design year (2005) population.
- \$60.3 billion to satisfy all categories of need for the current (1986) population.
- \$36.2 billion to meet the needs in Categories I, II, IIIA, and IVB potentially eligible for grant assistance under the Clean Water Act reserve capacity restriction.

The Total Design Year Needs for the Nation fell by \$36.0 billion from 1984 to 1986. This one-third reduction was due to a variety of factors, the most significant being the elimination of needs for which the established

documentation criteria were not satisfied. Changes in planning and design and reduction of needs through grant awards also accounted for the significant decrease in needs.

The 1986 Needs Survey identified 10,131 facilities with documented water quality or public health problems, including 315 facilities with combined sewer overflow needs.

The Needs Survey shows that there are 15,438 operating treatment plants in 1986, and that a total of 16,980 should be in operation when the needs are met for all documented facilities. The existing plants serve a population of 172 million, which represents 73 percent of the Nation's population. When the needs are met for all documented facilities, the population served will increase to 244 million or 87 percent of the Nation.

There are currently 13,280 facilities with secondary or advanced levels of treatment (up 4 percent from 1984), 2,112 facilities with less than secondary treatment (down 19 percent from 1984), and 149 facilities with raw discharges (down 26 percent from 1984).

Current Category I, II, IIIA, and IVB Needs for facilities presently out of compliance with final permit limits are estimated at \$15.5 billion. These needs, together with needs to maintain compliance at other operating treatment plants, represent almost three-fourths of the Current Category I, II, IIIA, and IVB Needs.

Introduction

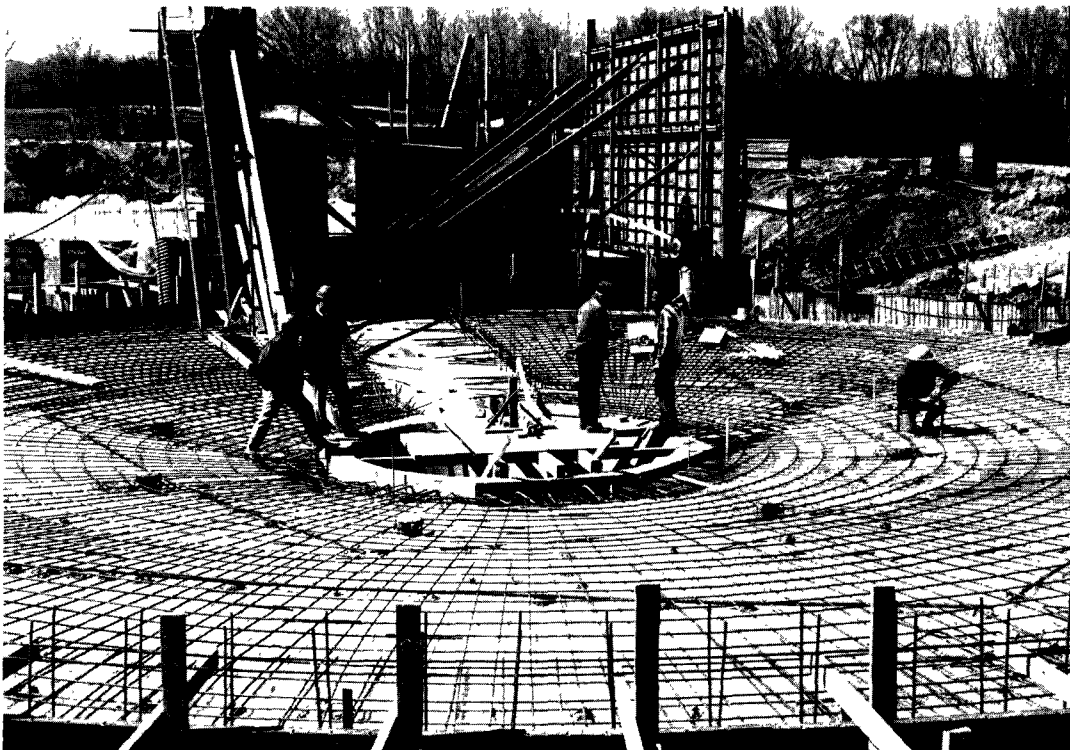
What is the Needs Survey?

This report summarizes the Environmental Protection Agency's (EPA) 1986 assessment of the cost of constructing all needed publicly owned wastewater treatment works necessary to meet the goals of the Clean Water Act. This biennial report is required by Sections 205(a) and 516(b)(1) of the Clean Water Act. The 1986 Needs Survey, a joint effort of the States and the EPA, is the eighth needs survey since enactment of the Federal Water Pollution Control Act Amendments of 1972.

Cost estimates presented in previous surveys have served as a basis for Congressional allotment of funds appropriated for the construction grants program in accordance with the provisions of the Clean Water Act. The Needs Survey is also used extensively to assist the Federal Government and the States in

program planning, policy evaluation, and management. Private firms, public interest groups, and trade associations use Needs Survey information in marketing, cost estimating, and policy formulation.

The Needs Survey data base contains detailed cost and technical information on approximately 24,000 wastewater facilities nationwide, including facilities with unmet needs and those for which needs have already been met. The primary emphasis of this report is to summarize the cost information. Detailed summaries of the technical data can be found in the Addendum to the Needs Survey which is published separately.



The 1986 Needs Survey

What Were the Major Objectives?

The major objectives of the 1986 Needs Survey were to establish a consistent basis for determining if a facility belonged in the Survey and to improve the accuracy of the cost estimates. These objectives were accomplished by establishing specific documentation criteria that were used to evaluate the existence of a facility's water quality or public health **problem** and the **cost** of the proposed solution.

Problem Documentation

The process of moving toward a more fully documented and consistent Needs Survey began with the 1984 Needs Survey. To account for the wide range in the quality of documentation used to support the estimates, the 1984 Survey separated the needs into those that were based on facilities planning or design estimates and those that were based on construction cost curves (where detailed planning was not available).

For the 1986 Survey, the EPA and representatives of State water pollution control programs established criteria that could be used to consistently document a water quality or public health problem of a facility. These criteria consisted of a list of 17 specific items (e.g., a facilities plan, sanitary survey, grant application, or compliance information). The State

then supplied documentation in accordance with this list for every facility that was not based on a facilities plan or design estimate. Needs that could not be documented were deleted from the Survey.

Cost Documentation

The EPA also required specific documentation to improve the cost estimates and actively sought to obtain updated cost estimates for facilities with high dollar needs. Some facilities had problems that could be documented, but cost estimates that could not. For these facilities, we used nationally developed cost curves to calculate the cost estimates.

The end result of this problem and cost documentation effort was to reduce the wide range in the quality of documentation in Needs Survey estimates. Needs presented in the 1986 Survey are for facilities that have a documented water quality or public health problem in accordance with specific criteria.

A more detailed discussion of the documentation process is presented in the section entitled "How Were the Needs Documented?" later in this report.

What Is a “Need?”

A “need” is a cost estimate for building a publicly owned wastewater treatment facility that may be eligible for Federal financial assistance under the Clean Water Act (1981 Amendments). Needs are estimated for facilities used in the conveyance, storage, treatment, recycling, and reclamation of municipal wastewater. Estimates are included for all types of required changes to wastewater facilities, such as the construction of entirely new facilities, and enlarging, upgrading, abandoning, and replacing existing facilities. Existing facilities are considered for replacement when they have reached the end of their design life and are no longer able to operate satisfactorily. Other types of changes to existing facilities are projected as a response to the statutory requirements of the Clean Water Act.

Needs estimates do not include costs for operation and maintenance. They also do not include needs that are ineligible for Federal assistance under Title II of the Clean Water Act (1981 Amendments), such as house connections to sewers and certain land acquisition costs not part of a treatment process.

The Needs Survey estimates are collected and reported in two ways. The first is by type of wastewater treatment project; the second is by timeframe.

Type of Wastewater Treatment Project

The types of wastewater treatment projects for which needs estimates are presented are:

- **Category I**—Secondary Treatment
- **Category II**—Advanced Treatment
- **Category IIIA**— Infiltration/
Inflow Correction
- **Category IIIB**—Replacement/
Rehabilitation of
Sewers
- **Category IVA**—New Collector
Sewers
- **Category IVB**—New Interceptor
Sewers
- **Category V**—Combined Sewer
Overflows

Typically, costs for Categories IIIB (replacement/rehabilitation of sewers), IVA (new collector sewers), and V (combined sewer overflows) are ineligible for Federal financial assistance. However, costs for these categories are included because the Clean Water Act provides a governor with discretionary funding authority to use up to 20 percent of a State's construction grants allotment in any fiscal year for these project categories. Since there is no way of knowing which facilities will be funded, or how much of the 20-percent discretionary funding authority will be used in any State, the entire need is reported in the Survey. More detailed explanations of each category can be found in the Glossary of Terms.

Timeframe

The EPA's assessment of the capital investment necessary to address municipal wastewater treatment needs was developed for three points in time:

1. **Current Needs** - needs for documented facilities to satisfy the current population on January 1, 1986.
2. **Maximum Eligible Needs** - the portion of the Design Year Needs eligible for Federal financial assistance in accordance with the Section 204(a)(5) reserve capacity limitations of the Clean Water Act.¹
3. **Design Year Needs** - total needs for documented facilities to satisfy the design year population (2005).

¹Section 204(a)(5) of the Clean Water Act states that, beginning October 1, 1984, no grant shall be made to construct that portion of a treatment works providing reserve capacity in excess of needs existing on the date of approval of a grant. Further, grants awarded after September 30, 1990 must be limited to needs existing on September 30, 1990. In cases where a grant applicant proposes to provide reserve capacity greater than that eligible for Federal financial assistance, the incremental costs of the additional reserve capacity shall be paid by the applicant.

However, there are exceptions to this limitation. The grandfathering provisions are:

- a. If the EPA awarded a grant for a Step 3 interceptor segment before December 29, 1981, grants for the remaining interceptor segments included in the facilities plan may include the full planned reserve capacity for up to 40 years.
- b. For primary, secondary, or advanced treatment facilities and associated interceptors included in a facilities plan approved before October 1, 1984 and with grants for Step 3 segments awarded before October 1, 1984, any remaining segments may include a 20-year reserve capacity.

To approximate the impact of the reserve capacity limitations of the 1981 Clean Water Act Amendments, EPA reduced the Total Design Year Needs submitted by the States because these estimates contained no restrictions on reserve capacity. EPA limited the size of each facility not affected by the grandfathering provisions of the Clean Water Act to its projected 1990 capacity.

What Are the Needs?

The EPA's estimates of the capital investment necessary to address the Nation's municipal wastewater treatment needs are presented in Table 1. An estimated \$76.2 billion is required to satisfy the total needs of facilities with documented current water quality or public health problems. Of this amount, \$60.3 billion is needed to satisfy the population in existence on January 1, 1986 within the service area of these facilities. The \$15.9-billion difference represents needs to serve growth within these service areas between 1986 and 2005 (the design year population).

If only Categories I, II, IIIA, and IVB are considered, the Design Year Needs are reduced to \$45.2 billion and the corresponding needs for the

current population drop to \$33.1 billion. These categories include secondary and advanced treatment, infiltration/inflow correction, and new interceptor sewers.

In addition to the Design Year and Current Needs projections, estimates were also developed for Maximum Eligible Needs. These are the needs which could be eligible for construction grants funding under the reserve capacity limitations of the Clean Water Act. The Maximum Eligible Needs for Categories I through V are \$67.2 billion. For Categories I, II, IIIA, and IVB, the Maximum Eligible Needs are \$36.2 billion. The relationship of Design Year Needs to both Current and Maximum Eligible Needs is shown in Figure 1.

FIGURE 1
Current, Maximum Eligible, and Design Year Needs for Publicly Owned Wastewater Treatment Facilities

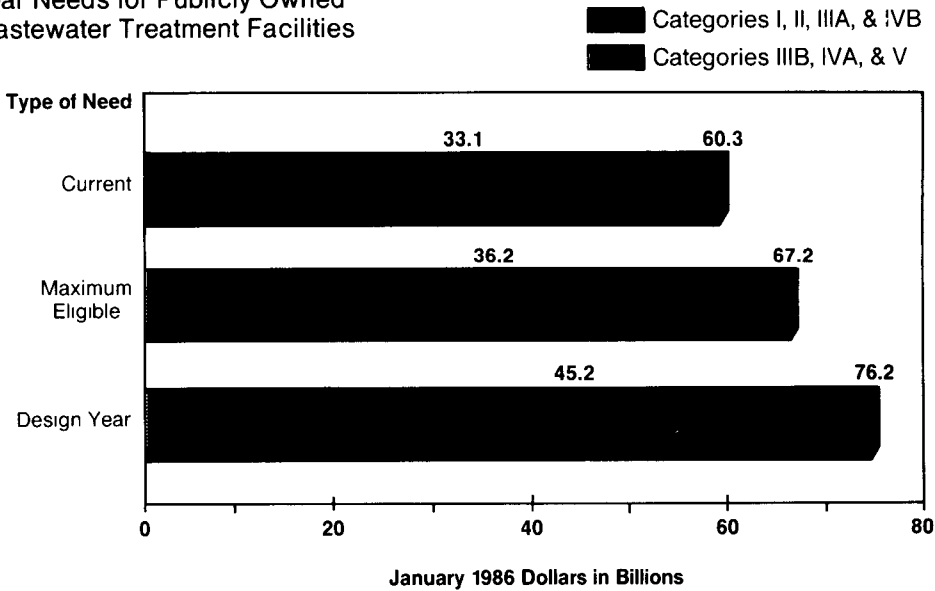


Table 1

Needs For Publicly Owned Wastewater Treatment Facilities
(January 1986 dollars in billions)

Needs Category		Current 1986 Needs¹	Maximum Eligible Needs²	Design Year Needs³
I	Secondary Treatment	\$17.8	\$20.1⁴	\$23.9
II	Advanced Treatment	3.3	3.6⁴	4.3
IIIA	Infiltration/Inflow	2.6	2.6	2.6
IIIB	Replacement/Rehabilitation⁵	3.0	3.0	3.0
IVA	New Collector Sewers⁵	9.0	12.8	12.8
IVB	New Interceptor Sewers	9.4	9.9⁴	14.4
V	Combined Sewer Overflows⁵	15.2	15.2	15.2
CATEGORIES I - V		60.3	67.2⁴	76.2
TREATMENT CATEGORIES I & II		21.1	23.7⁴	28.2
CATEGORIES I, II, IIIA, & IVB		33.1	36.2⁴	45.2

¹**Current Needs** - needs for documented facilities to satisfy the current population on January 1, 1986.

²**Maximum Eligible Needs** - the portion of the Design Year Needs eligible for Federal financial assistance in accordance with the Section 204(a)(5) reserve capacity limitations of the Clean Water Act.

³**Design Year Needs** - total needs for documented facilities to satisfy the design year population (2005).

⁴Needs estimates limited by Section 204(a)(5) reserve capacity limitations.

⁵For these categories, a governor may not use more than 20 percent of a State's allotment in any fiscal year *except* for combined sewer overflows (CSOs) funded under Section 201(n).

How Are the Needs Distributed?

To show how needs are distributed geographically throughout the Nation, we have disaggregated them by State. Figure 2, which presents Design Year Needs for Categories I through V, illustrates that the States with the largest needs are generally located in the northeast quadrant of the Nation, and in Florida, Texas, and California. The distribution of Current Needs, although not shown, follows the same pattern as Design Year Needs.

Figure 3 displays the State distribution of Maximum Eligible Needs for Categories I, II, IIIA, and IVB. The distribution pattern for States with the highest needs is similar to that shown in Figure 2, with the addition of Washington.

Maximum Eligible Needs are displayed on a per capita basis in Figure 4. Low-density States (such as Maine, New Hampshire, West Virginia, Kentucky, Alaska, and the Territories) are among the States with the highest Maximum Eligible per capita Needs. Appendix A provides a detailed presentation of needs for each State and U.S. Territory.

FIGURE 2
Design Year Needs by State for Categories I-V

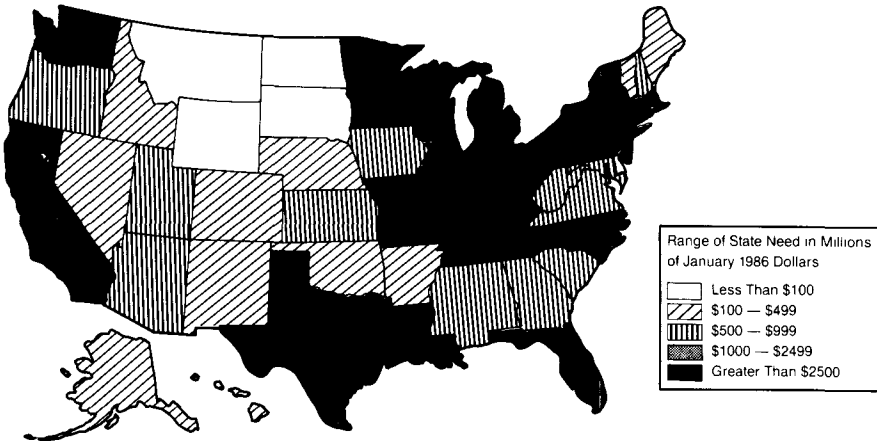


FIGURE 3
Maximum Eligible Needs by State for Categories I, II, IIIA, & IVB

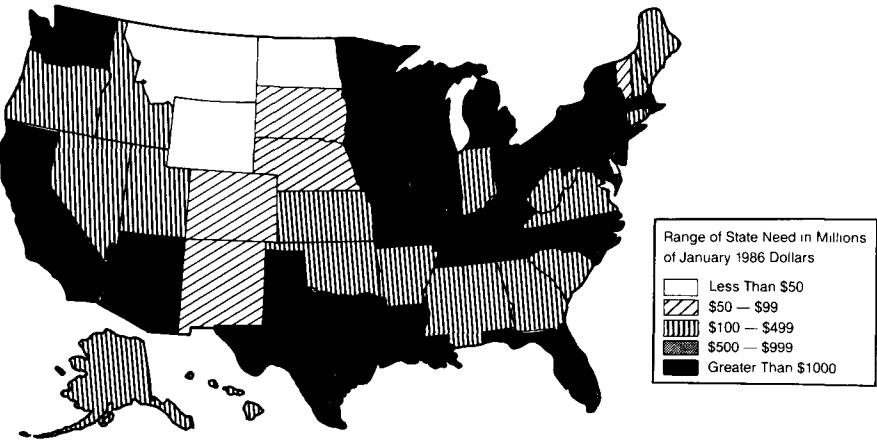
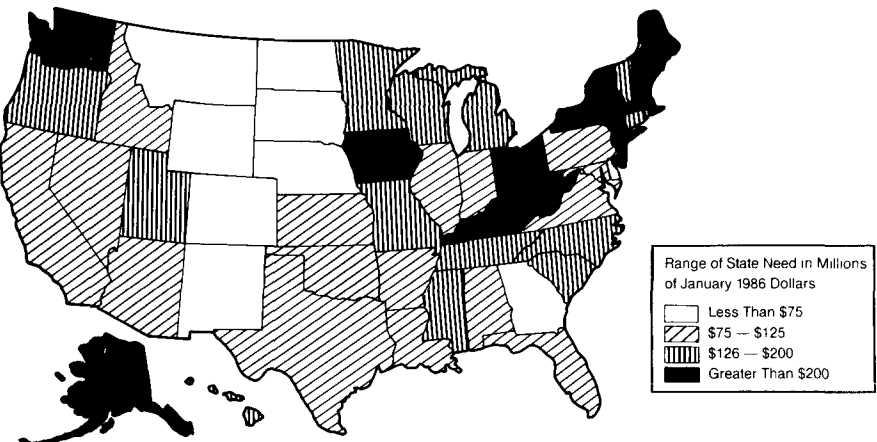


FIGURE 4
Per Capita Distribution of Maximum Eligible Needs by State



How Were the Needs Documented?

Documentation Process

The EPA implemented the documentation process to ensure that the needs for all facilities included in the 1986 Needs Survey were based on consistent, specific, and reliable forms of documentation. In previous Needs Surveys, States submitted needs to EPA based on a wide variety of documentation, many of which were inconsistent within and among the States.

EPA started this effort by identifying a list of ways a problem could be documented and thus become a need. A workgroup of representatives from the EPA and a number of States developed a preliminary list which was presented during a series of 1986 Needs Survey startup meetings to all 10 EPA Regions and all of the States. Based on comments received during these meetings, the EPA finalized the list. The final list of documentation criteria is shown in Table 2. Although some States objected to some elements of the final list, it was generally supported by a large majority of the States.

Table 2

List of Acceptable Documentation for the 1986 Needs Survey

Documentation Type	Use	
	Justification of Problem	Justification of Cost
Capital Improvement Plan A capital improvement plan must adequately address why the project is needed and provide project-specific costs.	Yes	Yes
Infiltration/Inflow (I/I) Analysis	Yes	Yes
Sewer System Evaluation Survey (SSES)	Yes	Yes
Final Engineer Estimate The final engineer's report is typically submitted as a result of a detailed facility design.	Yes	Yes
Cost of Previous Comparable Construction This document may be used to justify costs if stringent guidelines are followed and the costs are project specific.	No	Yes
Facilities Plan Excerpts from a facilities plan are acceptable forms of documentation to justify a need and to update cost estimates.	Yes	Yes
Plan of Study This documentation type must be an official project description. A plan of study precedes a facilities plan.	Yes	No
State Priority List A State's project priority list is acceptable as adequate problem documentation if the list was accepted by the EPA. The 1-year fundable plus 4-year planning portion of the FY 1985 or 1986 lists may be used with appropriate EPA Regional Office acceptance by October 31, 1985	Yes	No
State-Approved Area-Wide or Regional Basin Plan An area-wide or regional basin plan (per Section 208 or 303 of the CWA) is an acceptable document to justify that a need exists if specific project descriptions are cited and the plan is State approved. The problem areas should be specifically identified.	Yes	Yes
Grant Application Form (Step 3 or 4)	Yes	Yes
Municipal Compliance Plan This document may be used to justify a need and to update costs if the costs are project specific.	Yes	Yes
Diagnostic Evaluation Results of Municipal Wastewater Treatment Plants The results of a diagnostic evaluation of a treatment plant may be used if the results indicate that construction is needed to achieve compliance.	Yes	No
Administrative Order/Court Order/Consent Decree These documents may be used to justify that a need exists if they specifically describe an existing or historic problem demonstrating a need to construct.	Yes	No
Sanitary Survey A sanitary survey by a health agency can be used to justify a need if the document specifically identifies any existing or historic problem of high failure rates	Yes	No
State-Approved Local/County Comprehensive Water and Sewer Plan This document may be used to justify a need and to update costs if the document contains descriptions that are project specific and cost specific.	Yes	Yes
State Certification of Excessive Flow A document that is preliminary to an I/I report may be used to justify that a need exists for Category III.	Yes	No
State-Approved Municipal Wasteload Allocation Plan This document may be used to justify a need and to update costs if the document contains descriptions that are project specific and cost specific	Yes	Yes

After finalizing the list, facilities for which documentation already met the established criteria were identified. Generally, these facilities were based on facilities plans. The States' major effort in the 1986 Needs Survey was then to provide documentation for the remaining facilities, as shown in Table 3. Every need category for every facility had to be documented using the established list.

The EPA reviewed State-submitted documentation for every need category for each facility to ensure that it met the established list of criteria and that it was:

- **Based on a public health or water quality problem.**
- **A current problem (e.g., needs solely for future growth were not accepted).**
- **Project specific (e.g., documentation describing a county-wide problem of septic system failures due to poor soils was unacceptable to document the needs of a particular town in that county).**

States were also required to document their cost estimates in addition to their water quality or public health problems. The established documentation types were also used to verify cost estimates. As noted in Table 2, many types of documentation that were acceptable to establish a problem were inadequate to support a cost estimate.

Table 3		
Documentation Status of Facilities in 1984 Needs Survey		
	Total Needs (In billions of 1986 Dollars)	Number of Facilities
Facilities with No Needs	0	9,804
Facilities with Documented Needs (as per established criteria)	82.0	7,072
Facilities with Needs to be Documented (as per established criteria)	30.2	15,468
TOTAL	112.2	32,344

Once a State adequately documented a water quality or public health problem, the EPA accepted it into the Needs Survey whether or not a documented cost estimate was available. For needs with undocumented or unavailable cost estimates, the EPA used nationally derived cost curves to calculate the dollar amount.¹ The curves used level of treatment (e.g., secondary or advanced), general type of treatment (e.g., lagoon or mechanical plant), population, flow, and type of proposed improvement (e.g., upgrade, enlargement, abandonment, or reconstruction) to generate cost estimates.

To further improve the quality of cost estimates for the largest facilities, EPA asked the States to review and provide current cost estimates for their 20 largest facilities (in terms of dollar needs) or all facilities with needs greater than \$10 million. Many of

these facilities had needs based on old facilities plans with out-of-date cost estimates. For facilities where the State could not provide more current cost estimates and the best estimate was over 10 years old, the EPA also used the national cost curves.

An additional effort to improve cost estimates and verify documentation of needs included site visits by a State/EPA team to seven communities with large needs. This on-site investigation confirmed the documentation of \$3.6 billion in needs. Site visits were also conducted during previous Needs Surveys for this purpose.

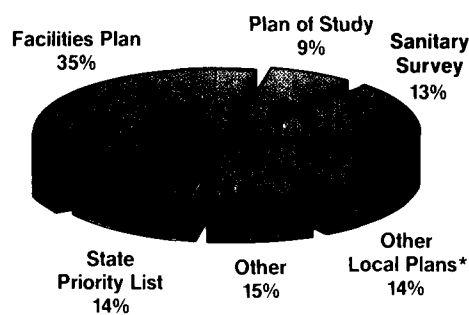
¹Texas and Connecticut use their own State-derived and EPA-accepted cost curves to estimate costs for their sewers.

Although controversial, the intent of the 1986 Needs Survey documentation effort was widely supported by the States. Some States, however, felt that not all their legitimate needs were included in the Survey because of the established documentation requirements. State concerns regarding documentation are presented in the section entitled "What are the Separate State Estimates?"

Results of Documentation

Thirty-three percent of the previously undocumented needs were eventually documented in accordance with the established criteria. As shown in Figure 5, the most prevalent forms of documentation used to substantiate a water quality or public health problem were facilities plans, local wastewater plans, sanitary surveys, priority lists, and plans of study. Adding these facilities to those that were already based on a facilities plan in the 1984 Needs Survey brings the total of facilities documented by a facilities plan to 62 percent. The resulting distribution of documentation types for facilities in the 1986 Needs Survey is presented in Figure 6.

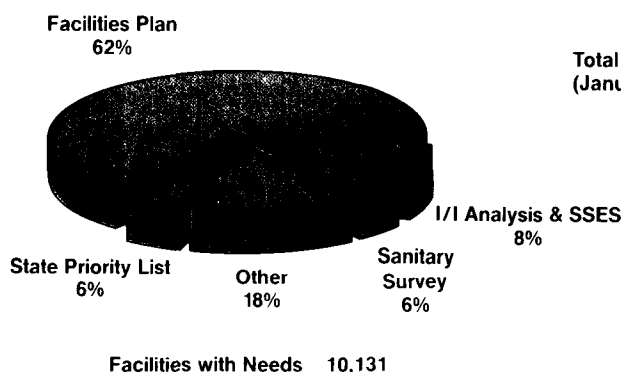
FIGURE 5
Type of Documentation Used to Include Facilities in the 1986 Survey That Were Previously Undocumented (by Percent of Facilities)



Number of Facilities Documented Since the 1984 Needs Survey = 3,673

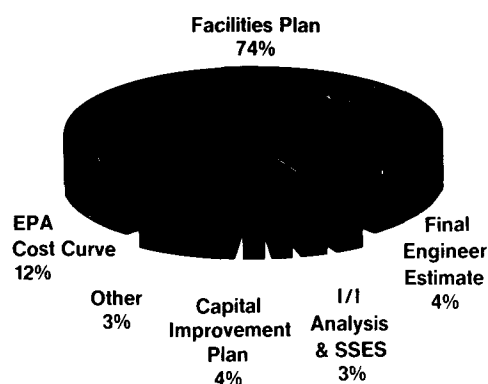
*Other Local Plans Include Capital Improvement Plans, Area-Wide or Regional Basin Plans, Diagnostic Evaluations, Sanitary Surveys, Local / County Comprehensive Water and Sewer Plans, and Municipal Wasteload Allocation Plans

FIGURE 6
1986 Needs Survey Facility Documentation (by Percent of Facilities)



In terms of cost documentation, Figure 7 shows that nearly three-quarters of all costs were documented with facilities plans. Another 12 percent of the costs were derived from national EPA cost curves. Cost curves were used when a facility with a documented problem did not have an acceptable or current cost estimate.

FIGURE 7
Type of Documentation Used to Support Cost Estimates in the 1986 Needs Survey (by Percent of Design Year Dollars)



Total Design Year Needs = \$76.2 Billion (January 1986 Dollars)

What Are the Separate State Estimates?

Only needs documented in accordance with the 17 criteria described in the section entitled "How Were the Needs Documented?" are included in the EPA estimates presented in this report. The inevitable consequence of applying these established documentation criteria is that legitimate needs may have been excluded. States were encouraged to submit separate State estimates for needs which they believe to be legitimate, but which were either justified with documents outside the established documentation criteria of the Survey or which had no written documentation. Approximately \$23 billion of needs reported in the 1984 Survey have been eliminated in this report because of the documentation requirements. A portion of the \$23 billion may be real needs for which States simply did not have the appropriate documentation. The inability of a State to verify the existence of a part of its 1984 needs does not necessarily mean that the needs do not exist.

Table 4								
Separate State Estimates - Current Needs (January 1986 dollars in millions)								
	Needs Category							Total
	I	II	IIIA	IIIB	IVA	IVB	V	
California	233.7	399.8	19.8	24.8	221.7	196.3	3.2	1099.3
Indiana	53.8	17.2	2.2	0.4	109.7	21.3	426.9	631.5
Maryland	72.0	267.0	0.0	0.0	118.0	0.0	15.0	472.0
Mississippi	39.3	10.6	0.6	0.5	34.0	14.1	0.0	99.1
New Jersey	0.0	0.0	0.0	0.0	0.0	0.0	600.0	600.0
New York	1,385.2	71.8	24.5	17.2	758.2	120.0	829.4	3,206.3
North Carolina ¹	—	—	—	—	—	—	—	—
Ohio	92.3	71.2	2.2	3.8	182.3	30.5	1,068.5	1,450.8
Pennsylvania	98.3	33.2	0.0	0.0	93.4	16.8	455.7	697.4
Texas	204.0	70.0	102.0	-42.0	340.0	193.0	0.0	867.0
Utah	8.5	2.6	0.0	0.4	10.5	21.3	0.0	43.3
West Virginia	63.4	1.1	0.0	0.0	105.4	14.2	126.2	310.3
TOTAL	2,250.5	944.5	151.3	5.1	1,973.2	627.5	3,524.9	9,477.0
¹ North Carolina did not submit an estimate for Current Needs.								

Some States submitted separate estimates for these additional needs with a brief summary of the reasons. In general, the type of additional needs reported are summarized as follows:

1. Needs to build or expand a centralized system for communities on individual systems. Specific plans or studies (in accordance with the 17 criteria) describing a current problem often do not exist. Many of these areas have not undertaken facilities planning or local sewer planning for identifying a current problem. Local health officials may have general knowledge of a problem but may not have conducted a sanitary survey or other planning required by the documentation criteria. Also, many

communities on septic systems may not have an existing problem, but States believe these systems will fail in the future because of lot sizes, or soil or hydrological conditions.

2. Needs to address combined sewer overflow (CSO) problems where no formal study is available to document evidence of a public health or water quality problem. In addition, no national planning standards have been defined for CSO problems. In the past, the existence of a CSO was sufficient to justify a need in the Survey.

3. Needs that are strictly for future growth without any current public health or water quality problems. Although they may become documented needs in the future, they were systematically excluded from the Survey because of the emphasis on current needs. This tended to affect the States with the largest growth projections.

Twelve States have submitted separate estimates which are presented in Tables 4 (Current Needs) and 5 (Design Year Needs). Other States indicated that, due to time and resource limitations, they were unable to submit an estimate for their States. The separate State estimates are *in addition* to the EPA estimates. If these estimates were added to the EPA assessment, the Total Design Year Needs would increase by \$15.4 billion.

Table 5
Separate State Estimates - Design Year Needs
(January 1986 dollars in millions)

	Needs Category							Total
	I	II	IIIA	IIIB	IVA	IVB	V	
California	1,706.0	443.0	20.7	14.8	1,226.0	456.2	3.2	3,869.9
Indiana	71.2	70.8	2.2	0.4	134.2	34.1	427.0	739.9
Maryland	81.0	291.0	0.5	1.0	128.0	44.0	17.0	562.5
Mississippi	69.2	17.8	0.6	0.5	45.1	24.5	0.0	157.7
New Jersey	200.0	0.0	0.0	0.0	0.0	0.0	600.0	800.0
New York	1,530.2	36.0	24.4	17.0	864.7	225.7	829.4	3,527.4
North Carolina	127.0	43.4	32.0	12.4	159.3	227.2	0.3	601.6
Ohio	116.5	61.4	759.0	0.0	170.0	40.4	1,068.5	2,215.8
Pennsylvania	124.3	38.8	0.0	0.0	134.6	33.2	455.7	786.6
Texas	613.0	100.0	102.0	-42.0	420.0	467.0	0.0	1,660.0
Utah	32.7	5.2	0.0	7.9	27.0	79.7	0.0	152.5
West Virginia	73.0	1.3	0.0	0.0	119.3	17.5	126.2	337.3
TOTAL	4,744.1	1,108.7	941.4	12.0	3,428.2	1,649.5	3,527.3	15,411.2

How Have the Needs Changed?

Needs have varied considerably from Survey to Survey. A comparison of the total needs for the past three Surveys is presented in Table 6. The most significant feature of this table is that, after considering inflation, the national needs decreased from 1984 to 1986 by \$36.0 billion, approximately 33 percent.

As displayed in Figure 8, the major reason for this change is the documentation requirement, accounting for \$23.4 billion (or 65 percent) of the \$36.0 billion reduction. Grant awards between January 1, 1984 and January 1, 1986 are the second largest reason for the reduction (\$8.8 billion, or 24 percent of the decrease). Revisions to the planning or design of facilities in this Survey were another significant reason for change. Such revisions were the result of local planning decisions to eliminate or combine facilities, or changes to the scope, level of treatment, and size of projected facilities in the Survey.

Table 6

Comparison of Total Needs
1982 through 1986 Needs Surveys*
(January 1986 dollars in billions except as noted)

Needs Category	1982 Survey	1984 Survey	1986 Survey
I Secondary Treatment	33.4	33.1	23.9
II Advanced Treatment	6.1	5.7	4.3
IIIA Infiltration/Inflow	3.0	2.9	2.6
IIIB Replacement/Rehabilitation	5.5	3.3	3.0
IVA New Collector Sewers	24.5	23.1	12.8
IVB New Interceptor Sewers	21.1	20.0	14.4
V Combined Sewer Overflows	42.1	24.1	15.2
CATEGORIES I - V	135.7	112.2	76.2
TREATMENT CATEGORIES I & II	39.5	38.8	28.2
CATEGORIES I, II, IIIA, & IVB	63.6	61.7	45.2
CATEGORIES I - V (nominal dollars)	118.4	108.9	76.2

*The 1982 and 1984 Surveys estimated total needs for the year 2000 population. The 1986 Survey estimates Total Design Year needs for the year 2005 population for documented facilities to better approximate a 20-year design life for the facilities in the Survey. For comparison purposes, all the needs have been presented in January 1986 dollars. We have also included a total line in nominal dollars (the face dollar value not adjusted for inflation) so that these numbers can be compared to past Survey reports.

FIGURE 8
Changes in Total Needs Between the
1984 and 1986 Needs Surveys

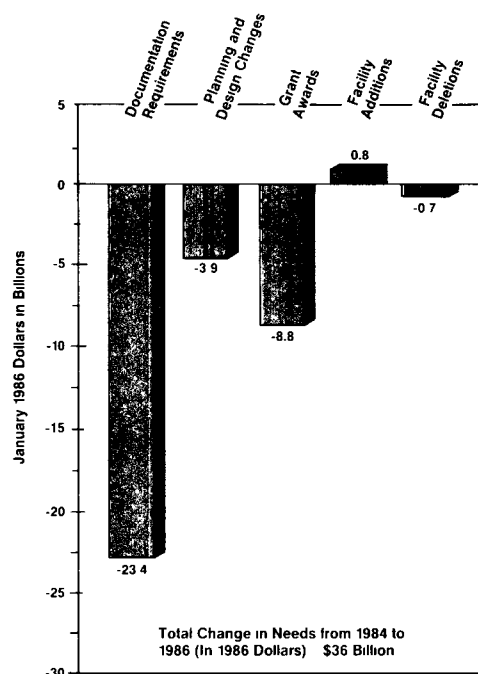


Table 6 shows that the categories with the largest dollar changes are secondary treatment (Category I), new collector sewers (Category IVA), and combined sewer overflows (Category V). Category I changes were due primarily to grant award deductions and the deletion of many facilities intended to replace failing septic tank systems. For the most part, Category IVA changes were also due to the deletion of these types of facilities. Combined sewer overflow (CSO) needs decreased primarily because previous Surveys included CSO needs wherever a CSO existed. The 1986 Survey required that the water quality or public health problems caused by the CSO meet the established documentation criteria to remain in the Survey.

Categories IIIA and IIIB experienced very little overall change because most infiltration/inflow correction and rehabilitation/replacement of sewers were well documented in previous Surveys.

Between 1984 and 1986, the total number of facilities decreased by 26 percent (from 32,344 in the 1984 Survey to 23,965 in the 1986 Survey). This was due almost entirely to the deletion of facilities for which a water quality or public health problem could not be documented in accordance with the established criteria. Of the deleted facilities, 77 percent were for communities with on-site systems proposed to be replaced by centralized collection and treatment.

Of the total 23,965 facilities included in the 1986 Survey, 10,131 have remaining needs. This represents a reduction of 55 percent from the

Table 7
Comparison of Total 1984 and 1986 Needs
for Documented Facilities
(January 1986 dollars in billions)

Needs Category		1984 ¹ Survey	1986 ² Survey
I	Secondary Treatment	22.7	23.9
II	Advanced Treatment	3.9	4.3
IIIA	Infiltration/Inflow	2.3	2.6
IIIB	Replacement/Rehabilitation	2.6	3.0
IVA	New Collector Sewers	10.9	12.8
IVB	New Interceptor Sewers	14.8	14.4
V	Combined Sewer Overflows	15.6	15.2
CATEGORIES I - V		72.8	76.2
TREATMENT CATEGORIES I & II		26.6	28.2
CATEGORIES I, II, IIIA, & IVB		43.7	45.2

¹Year 2000 Needs.

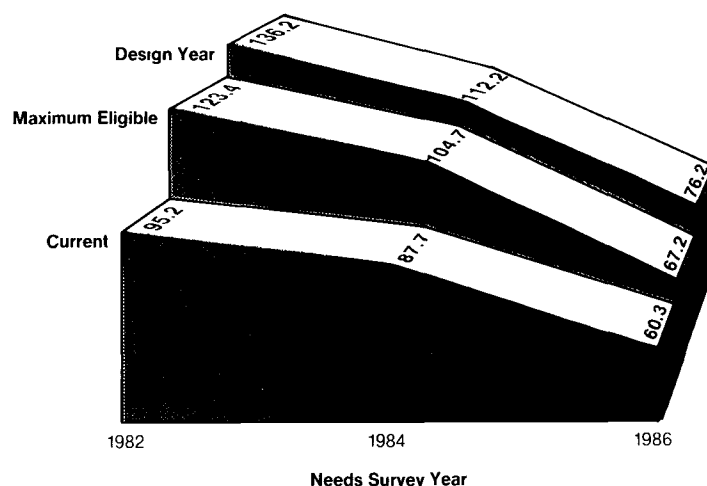
²Design Year (2005) Needs.

22,540 facilities with needs in the 1984 Survey.

For the 10,131 documented facilities with remaining needs in 1986, the cost estimate increased by 4.7 percent from 1984 to 1986. This change, shown in Table 7, was due primarily to improved cost estimates.

In addition, a graphic comparison of Total Needs (Categories I through V) from 1982 through 1986 is presented in Figure 9. It shows the overall decline in Current, Maximum Eligible, and Design Year Needs. The Total Design Year Needs from 1982 to 1986 declined by 44 percent.

FIGURE 9
Comparison of 1982 Through 1986
Needs Surveys (January 1986 Dollars
in Billions)



What is the Potential Impact of the Redefinition of Secondary Treatment?

Based on Section 23 of the 1981 Clean Water Act Amendments, the EPA developed a rule amending the secondary treatment regulation. This rule establishes categories of facilities that are deemed equivalent to secondary treatment (i.e., trickling filters and waste stabilization ponds) and establishes new (not to be exceeded) limitations for such facilities. The rule states that the effluent quality generally attainable by the trickling filter unit process or the waste stabilization pond treatment process be considered equivalent to secondary treatment as long as water quality is not adversely affected.

Table 8 shows the potential savings in capital costs that would be realized if the new options were adopted universally. These potential savings are not reflected in any of the other needs totals because they depend largely on decisions yet to be made by each permitting authority. Therefore, the estimate is a maximum; the actual amount could be considerably less. To date, progress has been very slow in identifying facilities for permit

adjustment. Less than 5 percent of the facilities considered eligible for permit adjustment have been identified thus far.

The estimate of savings is broken into two parts: savings at existing facilities and savings at new facilities. Savings at existing facilities would be realized if the authority could forego an upgrading program and continue to use an existing trickling filter or lagoon process until it requires replacement. Savings at new or replacement facilities would be realized if the authority could choose a less costly process train and still achieve the new equivalent limits for secondary treatment. It should be noted that the potential savings from the redefinition of secondary treatment reported in the 1986 Survey are only approximately one-third of the \$1.88 billion in savings reported in the 1984 Survey. This change results from a sizable reduction in treatment needs in 1986 and a refinement in the method for calculating potential savings.

Table 8

Potential Capital Cost Savings from Redefinition of Secondary Treatment
(January 1986 dollars in billions)

	Treatment Needs	Potential Savings
Existing Treatment Facilities	\$0.10	\$0.10
New Treatment Facilities	1.15	0.47
TOTAL	\$1.25	\$0.57

What Are the Needs for
Phased/Segmented
Facilities?

The sum of the Category I, II, IIIA, and IVB needs for grandfathered phased/segmented facilities is \$11.0 billion, as presented in Table 9.

A phased/segmented project is a discrete portion of a wastewater treatment works that may be separately funded if one or more of the following conditions exist:

- The cost would require a major portion of the State's allotment.
- Construction would last more than 3 years.
- The treatment works must be phased or segmented to meet a court order.

Grandfathered phased/segmented projects are eligible for 75 percent Federal grant share and are eligible for

full reserve capacity funding under Section 204(a)(5) of the Clean Water Act. The definition of grandfathered projects is discussed in the section entitled "What is a 'Need?'" Since only a portion of the needs for phased/segmented facilities are grandfathered, the estimates in Table 9 will be greater than the actual grandfathered amount.

The identification of phased/segmented projects was based on State input into the Grants Information and Control System. These projects were then cross-referenced with the Needs Survey, where corresponding needs estimates for Categories I, II, IIIA, and IVB were identified.

Table 9					
Total Category I, II, IIIA, & IVB Needs for Phased/Segmented Facilities (January 1986 dollars in billions)					
	Category of Need				
	Total	I	II	IIIA	IVB
Nation	11.0	6.3	1.0	0.3	3.4

What Are the Needs Required to Achieve and Maintain Compliance With Final Permit Limits?

The National Municipal Policy (NMP) has outlined the strategy for ensuring that all municipal dischargers achieve compliance with the Clean Water Act requirements by July 1, 1988. Dischargers needing construction to comply with this deadline should proceed using agreed-upon enforceable compliance schedules with or without Federal construction grants funding.

The compliance-related construction needs presented in this section are focused on those facilities that are **currently out of compliance** with their final permit limits and need construction to comply. They do not include facilities that need only operation and maintenance improvements to comply or noncompliant facilities for which grants were awarded prior to January 1, 1986 and are under construction.

It is important to note that there are additional compliance-related needs associated with **maintaining compliance** at existing operating facilities. For example, the cost of maintaining compliance includes needs for facilities where interim steps to achieve short-term compliance have been taken, but construction is needed to maintain long-term compliance. Because of the importance of maintaining compliance throughout the useful life of a facility, these needs estimates are also presented in this section.

The total compliance-related needs discussed in this section are approximately \$23.5 billion. This represents approximately three-fourths of the Current Category I, II, IIIA, and IVB Needs. The remaining needs for these categories are for facilities necessary to replace failing septic tank systems, improve sludge handling and disposal facilities, and maintain and improve other nondischarging facilities such as land treatment systems. A discussion of the compliance-related needs follows.

Needs for Facilities Currently Out of Compliance

The Current Category I, II, IIIA, and IVB Needs for facilities presently out of compliance with their final permit limits are estimated at \$15.5 billion. Of this amount, approximately \$13.0 billion is for majors, defined as plants with a flow of at least 1 mgd and certain smaller plants having significant water quality impacts. The remaining facilities, minors, constitute approximately \$2.5 billion of this Need. These needs represent almost 50 percent of the total Current Category I, II, IIIA, and IVB Needs. Figure 10 presents a detailed breakdown of these compliance needs. Figure 11 presents a further disaggregation of the needs by flow ranges.

FIGURE 10
Current Eligible Needs of Noncompliant POTWS by Needs Category

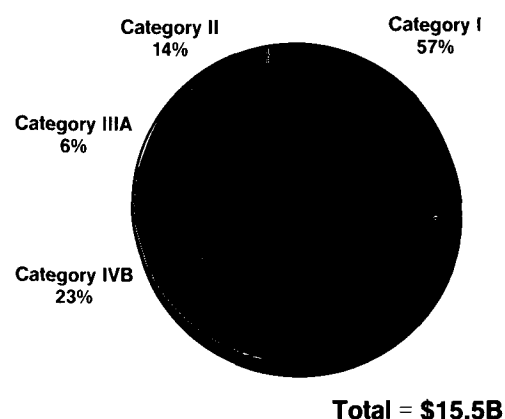
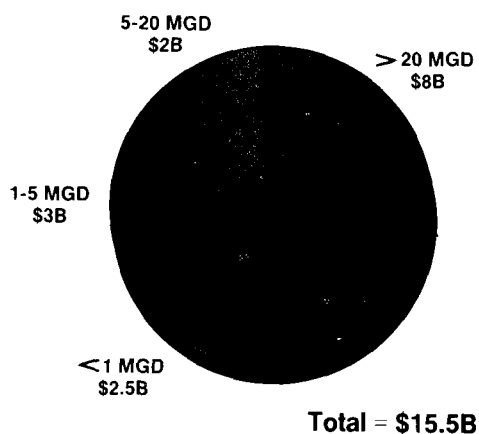


FIGURE 11
Current Eligible Needs of Noncompliant
POTWS by Facility Size



In terms of numbers of noncomplying treatment plants, there are approximately 800 majors¹ and roughly 2,000 minors² with Current Category I, II, IIIA, and IVB Needs for construction to comply with permit limits. This represents 20 percent of the total number of operating treatment plants in the nation. The existing level of treatment provided by these facilities is displayed in Figure 12. Approximately one-half will require construction of advanced treatment facilities. This is an indication that many of the currently noncomplying facilities needing construction are discharging to water quality-limited streams.

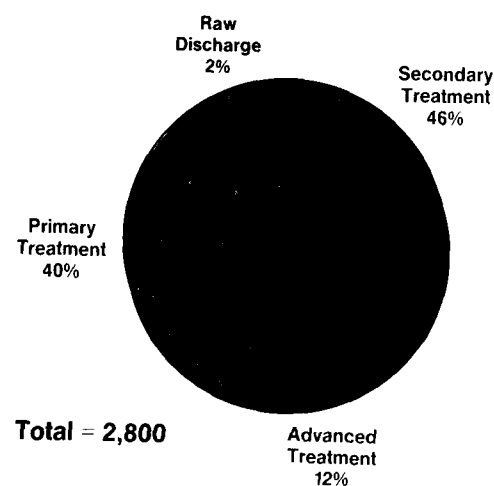
Needs to Maintain Compliance

The remaining Current Category I, II, IIIA, and IVB Needs for other operating treatment plants with a surface water discharge are approximately \$8.0 billion, much of which is needed to maintain compliance at these facilities. Included in this estimate are:

- Needs to provide a long-term solution for facilities currently in compliance due to interim measures (e.g., chemical addition).
- Needs to expand hydraulically overloaded facilities with effluent concentrations still within but near final effluent limits.

These needs to maintain compliance represent approximately 25 percent of the Current Category I, II, IIIA, and IVB Needs.

FIGURE 12
Noncompliant POTWS by Existing
Level of Treatment



¹Determined using EPA's Permit Compliance System (PCS) and coordination with EPA Regional Offices and States.

²This number has been estimated using information on potential noncompliant minors from the Needs Survey in conjunction with data submitted by most of the EPA Regional Offices.

Glossary of Terms

NOTE:

Definitions are given to help the reader understand the terms used, but are not necessarily definitions to be used for legal purposes.

Glossary

Advanced Treatment

See Needs Categories, Category II.

Biochemical Oxygen Demand (BOD)

The amount of dissolved oxygen required to decompose organic matter in water. BOD is a measure of pollution since heavy wasteloads have a high demand for oxygen.

Collector Sewers

See Needs Categories, Category IVA.

Combined Sewer Overflows (CSOs)

See Needs Categories, Category V.

Conveyance Needs

Capital investment needed to construct, expand, or upgrade sewer systems for transporting wastewater to treatment plants.

Current Needs

The cost estimate for building publicly owned wastewater treatment facilities (to serve the 1986 population) eligible for Federal financial assistance under the Clean Water Act.

Design Capacity

The average daily flow that a treatment plant is designed to accommodate.

Design Year (2005) Needs

The cost estimate for building publicly owned wastewater treatment facilities to satisfy the design year population for documented facilities.

Documentation

Documentation is a process in which the States were required to provide certain plans, reports, etc., to show that an actual problem existed and that it was: (1) related to a water quality or public health problem, (2) project specific, and (3) current. Needs were documented by using the list of 17 documentation types which the EPA accepted as verification of a need and a cost estimate. This list of 17 documentation types is listed in the section entitled "How were the Needs Documented?"

Effluent

Liquid that is discharged to the environment from a treatment facility after completion of the treatment process.

Effluent Standard

A limit on how much of a particular pollutant may be discharged by industries and municipalities into the environment. Effluent standards are set for each individual treatment facility. Minimum standards for all plants are set by the Clean Water Act. More stringent standards are set on a case-by-case basis whenever the protection of local water quality warrants.

Glossary

Facilities Plans

Plans and studies which directly relate to the construction of treatment works necessary to comply with the Clean Water Act. A facilities plan investigates needs and provides information on the cost effectiveness of alternatives. A recommended plan and an environmental assessment of the recommendations are also presented in a facilities plan.

A facilities plan includes a description of the treatment works for which construction drawings and specifications are to be prepared. The description includes preliminary engineering data, cost estimates for design and construction of the treatment works, and a schedule for completion of design and construction.

Federal Grant Share

Level of Federal participation in a grant for municipal wastewater treatment facilities. After October 1, 1984, the Federal share is generally 55 percent of eligible project costs, except for grandfathered phased or segmented projects that may receive 75 percent, or innovative/alternative projects that may receive a 20-percent bonus (not to exceed 85 percent). A governor may further reduce the grant share uniformly throughout a State.

Grandfathered Projects

Phases or segments of projects that may receive 75 percent Federal funding without reserve capacity restrictions after October 1, 1984 because a previous phase or segment described in the same facilities planning document received funding prior to that date.

Infiltration/Inflow Correction

See Needs Categories, Category IIIA.

Influent

Wastewater flowing into a treatment facility.

Interceptor Sewers

See Needs Categories, Category IVB.

Lagoon

A shallow pond where sunlight, bacterial action, and oxygen work to treat wastewater. Lagoons are widely used by small communities to provide wastewater treatment.

Majors

Publicly owned treatment works (POTWs) with flows greater than or equal to 1 mgd (or service population equivalent to 10,000 persons) and certain other POTWs having significant water quality impacts.

Maximum Eligible Needs

The cost estimate for constructing publicly owned wastewater treatment facilities which represents the portion of the Design Year Needs eligible for Federal assistance in accordance with the Section 204(a)(5) reserve capacity limitations of the Clean Water Act.

Glossary

Minors

Publicly owned treatment works (POTWs) with flows less than 1 mgd.

National Municipal Policy (NMP)

The policy, developed by the EPA and the States, by which all noncomplying POTWs must be managed until they return to compliance with applicable Clean Water Act requirements. Deadline is set for July 1, 1988. The 1986 Needs Survey covers only those POTWs which require construction to satisfy Clean Water Act permit requirements. The NMP also deals with facilities which can return to compliance through improved operation and maintenance.

Needs

The cost estimate for constructing publicly owned wastewater treatment facilities potentially eligible for Federal financial assistance under the Clean Water Act.

Needs Categories

Categories of projects that are potentially eligible for Federal financial assistance under the Clean Water Act. Needs categories are as follows:

Secondary Treatment (Category I)

The minimum level of treatment which must be maintained by all treatment facilities, except those facilities granted waivers under Section 301(h) of the Clean Water Act. Treatment levels are specified in terms of the concentration of conventional pollutants in the wastewater being discharged from a facility. Secondary treatment requires an 85 percent reduction in conventional pollutant concentration in the wastewater treated by a facility. Needs reported in this category are necessary to attain secondary treatment. Needs to attain incremental reductions in conventional pollutant concentrations beyond secondary treatment requirements are included in Category II.

Advanced Treatment (Category II)

A level of treatment more stringent than secondary treatment. Advanced treatment requires greater than 85 percent reduction in conventional pollutants, or a significant reduction in nonconventional pollutants present in the wastewater treated by a facility. Needs reported in this category are necessary to attain incremental reductions in pollutant concentrations beyond basic secondary treatment.

Infiltration/Inflow Correction (Category IIIA)

The penetration into a sewer system of water other than wastewater from the ground through such means as defective pipes or manholes (infiltration) or from sources such as drains, storm sewers, and other improper entries into the system (inflow). Included in this category are costs for correction of sewer system infiltration/inflow problems. Costs also are reported for preliminary sewer system analysis and for detailed sewer system evaluation surveys.

Replacement/Rehabilitation of Sewers (Category IIIB)

Reinforcement or reconstruction of structurally deteriorating sewers. This category includes cost estimates for rehabilitation of existing sewer systems beyond those for normal maintenance. Costs are reported if the corrective actions are necessary to maintain the structural integrity of the system.

Glossary

Collector Sewers (Category IVA)

Pipes used to collect and carry wastewater from an individual source to an interceptor sewer that will convey the wastewater to a treatment facility. This category includes the costs of constructing new collector sewer systems and appurtenances.

Interceptor Sewers (Category IVB)

Major sewer lines receiving wastewater flows from collector sewers. The interceptor sewer carries wastewater directly to the treatment plant or to another interceptor. This category includes costs for constructing new interceptor sewers and pumping stations necessary for conveying wastewater from collector sewer systems to treatment facilities or to another interceptor.

Combined Sewer Overflow (CSO) (Category V)

A discharge of a mixture of stormwater and domestic wastes that occurs when the flow capacity of a sewer system is exceeded during a rainstorm. Costs reported are for grant-eligible facilities to prevent or control periodic bypassing of untreated wastes from sewers which convey a combination of wastewater and stormwater to achieve water quality objectives. This category does not include costs for overflow control allocable to flood control or drainage improvement or for treatment or control of stormwater in separate storm and drainage systems.

Ocean Discharge Waiver

A variance from the secondary treatment requirements for discharges into marine waters.

Phased/Segmented Project

A wastewater treatment works construction project that is divided into substantial, discrete portions for Federal funding or construction bidding purposes. Phases or segments are generally built in sequence and funded from consecutive yearly appropriations.

Primary Treatment

The first stage of wastewater treatment; removal of floating debris and solids by screening and sedimentation.

Replacement/Rehabilitation of Sewers

See Needs Categories, Category IIIB.

Reserve Capacity

Extra hydraulic capacity built into treatment plants and interceptor sewers to accommodate flow increases due to future population growth.

Secondary Treatment

See Needs Categories, Category I.

Glossary

Septic Tanks

Used as part of a septic system to treat and dispose of wastewater on-site from individual houses. The septic tank is the predominant method used to treat wastewater from individual houses located in unsewered areas.

The septic tank is an enclosure that stores and processes wastes. Bacteria decompose the organic matter into sludge which must be pumped off periodically. The liquid is disposed of through a subsurface drain field.

Suspended Solids (SS)

That portion of the pollutants that are in the form of very small solid particles. Suspended solids are removed through a combination of settling and filtering operations.

Tertiary Treatment

Advanced treatment of wastewater that goes beyond the secondary or biological stage. It removes nutrients such as phosphorus and nitrogen and most suspended solids.

301(h) Ocean Discharge Waiver

A variance from the secondary treatment requirements for treatment facilities discharging to bays or estuaries.

Treatment Plant

A structure constructed to treat wastewater prior to discharge to the environment. The treatment is accomplished by subjecting the wastewater to a combination of physical, chemical, and/or biological processes which reduce the concentration of contaminants in the wastewater.

Trickling Filter Unit Process

A biological treatment process where wastewater is treated by trickling wastewater over rocks or other media on which colonies of bacteria are growing. The bacteria remove the organic impurities from the wastewater and use it as a food source. The name "trickling filter" is a misnomer since no filtering action occurs in a physical sense.

Urbanized Area

Refers to the area surrounding cities which have more than 50,000 residents. The urbanized areas delineated by the Bureau of Census are used for Needs Survey purposes.

Wastewater

Dissolved or suspended waterborne waste material from homes, farms, businesses, and industries.

Appendices

These Appendices contain State and national summaries of the various cost estimates collected during the 1986 Needs Survey. Included in Appendix A are summaries by State of Current Needs, Maximum Eligible Needs, and Design Year Needs by Needs Survey category. Appendix B contains a summary of needs by State from the 1984 Survey. Appendix C contains selected technical information.

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Appendix A

Current, Maximum Eligible,
and Design Year Needs
(By State)

Table A-1

**Current 1986 Publicly Owned Wastewater Treatment Needs Eligible for
Federal Financial Assistance Under the Clean Water Act (by State)**

Table A-1 summarizes the EPA assessment of needs by State for the current 1986 population for facilities meeting the established documentation criteria.

The Current 1986 Needs represent the capital investment necessary to build all needed publicly owned wastewater treatment facilities to meet the requirements of the Clean Water Act. The Current Needs do not contain an allowance for future population growth and migration. The assessment includes all planning, design, and construction activities eligible for Federal financial assistance under the Clean Water Act. All ineligible project costs are excluded from the assessment. States were asked to provide both Design Year and Current Needs for all facilities in the 1986 Survey. For facilities where the Current Needs were unavailable, the EPA estimated them by prorating needs based on the ratio of 1986 to 2005 populations.

Needs estimates presented in Table A-1 may vary slightly from those presented in Table 1 due to rounding.

Table A-1
Current 1986 Publicly Owned Wastewater Treatment Needs Eligible for
Federal Financial Assistance Under the Clean Water Act (by State)

	Category of Need								(I, II, III A, IV B)
	Total	I	II	III A	III B	IV A	IV B	V	
Alabama	445	156	42	78	15	92	62	0	338
Alaska	112	50	0	5	0	18	39	0	94
Arizona	477	255	72	1	2	32	115	0	443
Arkansas	232	122	15	25	2	33	35	0	197
California	4632	2173	16	252	487	323	369	1012	2810
Colorado	72	32	32	2	4	0	2	0	68
Connecticut	1041	166	83	23	11	236	141	381	413
Delaware	48	11	2	0	0	21	13	1	26
Dist. of Columbia	245	87	158	0	0	0	0	0	245
Florida	2352	777	208	46	26	883	408	4	1439
Georgia	599	159	82	43	26	57	154	78	438
Hawaii	208	80	3	0	0	88	37	0	120
Idaho	118	49	4	5	3	26	29	2	87
Illinois	2732	394	287	92	38	83	239	1599	1012
Indiana	1485	131	127	46	9	164	91	917	395
Iowa	595	338	65	50	2	36	99	5	552
Kansas	367	120	0	21	23	42	147	14	288
Kentucky	1140	193	53	76	8	536	252	22	574
Louisiana	796	284	19	58	33	237	165	0	526
Maine	267	98	0	24	7	55	64	19	186
Maryland	642	112	257	61	57	60	86	9	516
Massachusetts	3733	1381	44	39	18	559	589	1103	2053
Michigan	3016	809	51	52	40	365	654	1045	1566
Minnesota	903	300	57	19	162	25	97	243	473
Mississippi	393	149	45	62	1	61	75	0	331
Missouri	925	469	2	13	13	46	284	98	768
Montana	39	12	0	0	2	15	9	1	21
Nebraska	120	75	0	0	8	7	10	20	85
Nevada	95	50	25	2	3	9	6	0	83
New Hampshire	735	117	4	9	4	200	176	225	306
New Jersey	3290	1339	142	225	104	252	461	767	2167
New Mexico	56	25	0	0	15	8	8	0	33
New York	11451	1918	154	169	1542	1149	913	5606	3154
North Carolina	921	201	61	76	31	281	270	1	608
North Dakota	15	5	0	0	0	0	10	0	15
Ohio	3096	562	408	272	46	466	752	590	1994
Oklahoma	268	77	63	12	12	30	74	0	226
Oregon	727	150	35	40	33	248	120	101	345
Pennsylvania	1453	598	103	18	5	488	125	116	844
Rhode Island	346	44	3	0	0	53	45	201	92
South Carolina	446	132	30	36	0	67	181	0	379
South Dakota	58	39	3	0	0	7	7	2	49
Tennessee	869	312	70	155	18	215	90	9	627
Texas	2088	945	292	124	57	168	502	0	1863
Utah	288	165	34	43	5	21	20	0	262
Vermont	144	43	10	1	5	19	15	51	69
Virginia	792	225	26	21	4	157	159	200	431
Washington	2069	764	15	126	78	247	294	545	1199
West Virginia	856	266	10	27	15	358	165	15	468
Wisconsin	1107	375	49	64	3	86	320	210	808
Wyoming	24	18	0	0	0	1	5	0	23
American Samoa	12	4	0	1	0	5	2	0	7
Guam	21	16	0	0	0	3	2	0	18
Mariana Islands	22	9	0	0	0	3	10	0	19
Puerto Rico	1131	322	2	36	14	345	391	21	751
Trust Territories	90	70	0	0	0	12	8	0	78
Virgin Islands	18	7	0	0	0	8	3	0	10
Total	60222	17780	3263	2550	2991	9006	9399	15233	32992

Table A-2

Maximum Eligible Publicly Owned Wastewater Treatment Needs Eligible for Federal Financial Assistance Under the Clean Water Act (by State)

Table A-2 summarizes the EPA's assessment of the Maximum Eligible Needs. The Maximum Eligible Needs represent the portion of the Design Year Needs that are potentially eligible for Federal financial assistance under the Section 204(a)(5) reserve capacity limitations of the Clean Water Act. Specifically, Maximum Eligible Needs exclude the portion of the Design Year Needs that are attributable to reserve capacity for population growth after 1990 except for certain grandfathered phased/segmented projects.

All ineligible project costs are excluded from the assessment.

Needs estimates presented in Table A-2 may vary slightly from those presented in Table 1 due to rounding.

Table A-2
Maximum Eligible Publicly Owned Wastewater Treatment Needs Eligible for
Federal Financial Assistance Under the Clean Water Act (by State)

	Category of Need							
	Total	I	II	IIIA	IIIB	IVA	IVB	V (I, II, IIIA, IVB)
Alabama	487	163	45	78	15	119	67	0 353
Alaska	173	81	0	5	0	19	68	0 154
Arizona	567	331	72	1	2	38	123	0 527
Arkansas	266	135	17	25	2	50	37	0 214
California	5263	2685	50	252	487	377	400	1012 3387
Colorado	77	36	33	2	4	0	2	0 73
Connecticut	1091	172	84	23	11	279	141	381 420
Delaware	52	11	2	0	0	25	13	1 26
Dist. of Columbia	245	87	158	0	0	0	0	0 245
Florida	3942	958	249	46	26	2230	429	4 1682
Georgia	655	176	85	43	26	83	164	78 468
Hawaii	309	98	3	0	0	144	64	0 165
Idaho	170	77	8	5	3	37	38	2 128
Illinois	2797	431	301	92	38	96	240	1599 1064
Indiana	1555	132	128	46	9	232	91	917 397
Iowa	647	362	69	50	2	40	119	5 600
Kansas	390	139	0	21	23	45	148	14 308
Kentucky	1358	266	71	76	8	646	269	22 682
Louisiana	925	319	22	58	33	312	181	0 580
Maine	295	103	0	24	7	78	64	19 191
Maryland	675	114	259	61	57	89	86	9 520
Massachusetts	3913	1405	50	39	18	709	589	1103 2083
Michigan	3098	823	52	52	40	425	661	1045 1588
Minnesota	1010	404	57	19	162	27	98	243 578
Mississippi	434	158	52	62	1	81	80	0 352
Missouri	973	496	2	13	13	60	291	98 802
Montana	43	13	0	0	2	18	9	1 22
Nebraska	130	84	0	0	8	8	10	20 94
Nevada	135	69	42	2	3	13	6	0 119
New Hampshire	835	134	6	9	4	252	205	225 354
New Jersey	3538	1479	157	225	104	328	478	767 2339
New Mexico	139	68	0	0	15	31	25	0 93
New York	12226	1940	163	169	1542	1893	913	5606 3185
North Carolina	1076	214	65	76	31	403	286	1 641
North Dakota	17	6	0	0	0	0	11	0 17
Ohio	3265	590	434	272	46	565	768	590 2064
Oklahoma	339	129	77	12	12	30	79	0 297
Oregon	778	159	42	40	33	279	124	101 365
Pennsylvania	1625	658	108	18	5	595	125	116 909
Rhode Island	388	70	4	0	0	60	53	201 127
South Carolina	497	152	33	36	0	84	192	0 413
South Dakota	60	40	3	0	0	7	8	2 51
Tennessee	954	323	72	155	18	287	90	9 640
Texas	2430	1138	346	124	57	227	538	0 2146
Utah	360	224	38	43	5	30	20	0 325
Vermont	149	44	10	1	5	23	15	51 70
Virginia	859	247	28	21	4	193	166	200 462
Washington	2097	782	17	126	78	252	297	545 1222
West Virginia	920	277	10	27	15	411	165	15 479
Wisconsin	1189	412	49	64	3	117	334	210 859
Wyoming	33	26	0	0	0	1	6	0 32
American Samoa	18	5	0	1	0	10	2	0 8
Guam	40	28	0	0	0	8	4	0 32
Mariana Islands	35	12	0	0	0	5	18	0 30
Puerto Rico	1462	504	4	36	14	440	443	21 987
Trust Territories	98	73	0	0	0	16	9	0 82
Virgin Islands	18	7	0	0	0	8	3	0 10
TOTAL	67120	20069	3577	2550	2991	12835	9865	15233 36061

Table A-3**Design Year Needs for Publicly Owned Wastewater Treatment Works (by State)**

Table A-3 summarizes the EPA's assessment of needs to satisfy the design year (2005) population for facilities which meet the established documentation criteria. The needs estimates are not restricted by any limitations on reserve capacity.

The Total Design Year Needs represent the capital investment necessary to build all publicly owned wastewater treatment facilities that have met the established documentation criteria. These are the funds necessary to provide adequate wastewater treatment systems for the 1986 population, plus population growth and migration for the next 19 years. The assessment includes all planning, design, and construction activities considered eligible for funding under the Clean Water Act.

Needs estimates presented in Table A-3 may vary slightly from those presented in Table 1 due to rounding.

Table A-3

Design Year Needs for Publicly Owned Wastewater Treatment Works (by State)

	Category of Need							
	Total	I	II	IIIA	IIIB	IVA	IVB	V
Alabama	695	225	60	78	15	119	198	0
Alaska	221	93	0	5	0	19	104	0
Arizona	753	433	73	1	2	38	206	0
Arkansas	365	201	24	25	2	50	63	0
California	6139	3142	97	252	487	377	772	1012
Colorado	112	48	44	2	4	0	14	0
Connecticut	1166	193	107	23	11	279	172	381
Delaware	68	12	2	0	0	25	28	1
Dist. of Columbia	245	87	158	0	0	0	0	0
Florida	5414	1599	314	46	26	2230	1195	4
Georgia	972	281	119	43	26	83	342	78
Hawaii	363	132	3	0	0	144	84	0
Idaho	219	110	10	5	3	37	52	2
Illinois	2975	540	325	92	38	96	285	1599
Indiana	1618	168	136	46	9	232	110	917
Iowa	736	388	72	50	2	40	179	5
Kansas	606	200	1	21	23	45	302	14
Kentucky	1517	286	78	76	8	646	401	22
Louisiana	1102	418	27	58	33	312	254	0
Maine	321	119	0	24	7	78	74	19
Maryland	866	197	331	61	57	89	122	9
Massachusetts	4169	1493	65	39	18	709	742	1103
Michigan	3200	878	59	52	40	425	701	1045
Minnesota	1084	446	68	19	162	27	119	243
Mississippi	531	207	63	62	1	81	117	0
Missouri	1109	548	3	13	13	60	374	98
Montana	49	17	0	0	2	18	11	1
Nebraska	136	89	0	0	8	8	11	20
Nevada	152	75	42	2	3	13	17	0
New Hampshire	897	150	6	9	4	252	251	225
New Jersey	3647	1531	188	225	104	328	504	767
New Mexico	156	70	0	0	15	31	40	0
New York	12456	2004	177	169	1542	1893	1065	5606
North Carolina	1452	299	101	76	31	403	541	1
North Dakota	21	7	0	0	0	0	14	0
Ohio	3545	716	475	272	46	565	881	590
Oklahoma	435	174	90	12	12	30	117	0
Oregon	866	204	50	40	33	279	159	101
Pennsylvania	1713	713	119	18	5	595	147	116
Rhode Island	388	70	4	0	0	60	53	201
South Carolina	725	219	42	36	0	84	344	0
South Dakota	65	43	3	0	0	7	10	2
Tennessee	1406	434	98	155	18	287	405	9
Texas	3259	1475	456	124	57	227	920	0
Utah	561	370	66	43	5	30	47	0
Vermont	155	48	12	1	5	23	15	51
Virginia	992	308	60	21	4	193	206	200
Washington	2485	930	19	126	78	252	535	545
West Virginia	982	310	10	27	15	411	194	15
Wisconsin	1244	432	65	64	3	117	353	210
Wyoming	37	28	0	0	0	1	8	0
American Samoa	20	6	0	1	0	10	3	0
Guam	40	28	0	0	0	8	4	0
Mariana Islands	46	18	0	0	0	5	23	0
Puerto Rico	1558	545	4	36	14	440	498	21
Trust Territories	114	85	0	0	0	16	13	0
Virgin Islands	27	10	0	0	0	8	9	0
TOTAL	76195	23852	4326	2550	2991	12835	14408	15233

Appendix B

Summary of 1984 Needs
(By State)

Tables B-1 and B-2

Current 1984 and Future Year 2000 Needs Reported in the 1984 Needs Survey (by State)

Tables B-1 and B-2 summarize the results of the EPA's 1984 Needs Survey. Current 1984 needs are listed in Table B-1 and total year 2000 needs are listed in Table B-2. All values are given in millions of 1986 dollars. These tables are provided as a convenience to those who wish to compare the 1984 and the 1986 Survey results. Table B-1 is comparable to Table A-1.

Needs estimates presented in Table B-2 may vary slightly from those presented in Table 6 due to rounding.

Table B-1
Current 1984 Needs Reported in the 1984
Needs Survey (by State)

	Category of Needs							
	Total Needs	I	II	IIIA	IIIB	IVA	IVB	V
Alabama	833	259	78	92	2	314	88	0
Alaska	170	76	0	5	0	22	61	6
Arizona	547	207	65	10	1	156	108	0
Arkansas	354	143	37	31	2	105	36	0
California	4267	1348	40	352	485	1249	260	533
Colorado	151	97	9	5	1	20	3	16
Connecticut	1762	424	76	18	21	591	175	457
Delaware	283	25	1	5	5	32	26	189
Dist. of Columbia	305	99	174	0	0	0	0	32
Florida	2970	864	218	121	19	1261	484	3
Georgia	1018	224	145	69	16	250	139	175
Hawaii	381	84	0	0	20	230	47	0
Idaho	223	79	2	6	3	96	29	8
Illinois	4033	581	260	172	39	166	200	2615
Indiana	2043	302	108	22	3	251	97	1260
Iowa	974	414	88	65	2	115	118	172
Kansas	675	130	1	21	23	89	150	261
Kentucky	1358	282	87	83	6	505	187	208
Louisiana	1010	303	22	88	19	394	184	0
Maine	913	160	2	23	10	208	109	401
Maryland	1136	168	511	59	59	228	85	26
Massachusetts	4678	1380	110	36	21	906	718	1507
Michigan	3223	961	233	40	101	512	619	757
Minnesota	1313	327	78	20	21	123	211	533
Mississippi	523	220	57	61	1	109	75	0
Missouri	2910	804	3	51	282	256	412	1102
Montana	63	16	2	1	1	26	16	1
Nebraska	178	130	0	1	1	22	7	17
Nevada	96	41	22	3	3	21	6	0
New Hampshire	1035	224	3	9	5	303	259	232
New Jersey	4685	2241	132	187	81	300	524	1220
New Mexico	101	54	1	0	1	36	9	0
New York	15178	3236	171	193	1563	2615	1046	6354
North Carolina	1069	253	92	101	1	452	169	1
North Dakota	23	9	0	0	0	4	2	8
Ohio	4540	683	499	103	242	619	1109	1285
Oklahoma	405	159	57	13	11	90	75	0
Oregon	1008	85	13	81	19	277	73	460
Pennsylvania	4449	1255	262	15	3	1176	255	1483
Rhode Island	779	130	8	1	40	183	89	328
South Carolina	756	166	35	78	0	286	191	0
South Dakota	98	51	12	1	1	3	5	25
Tennessee	1742	355	78	163	12	424	77	633
Texas	2809	1123	163	233	18	536	736	0
Utah	387	214	49	45	0	53	26	0
Vermont	278	76	28	4	7	55	19	89
Virginia	1343	538	41	19	2	381	186	176
Washington	2973	1040	16	129	90	683	333	682
West Virginia	1965	378	17	5	3	736	188	638
Wisconsin	1688	557	31	54	7	167	682	190
Wyoming	37	31	1	1	0	2	2	0
American Samoa	41	15	0	0	0	7	19	0
Guam	19	8	0	2	1	6	2	0
Mariana Islands	64	11	1	0	0	35	17	0
Puerto Rico	1689	311	3	27	15	953	359	21
Trust Territories	99	48	1	0	0	34	16	0
Virgin Islands	25	11	0	1	0	9	4	0
TOTAL	87675	23410	4143	2925	3289	18682	11122	24104

Tables B-1 and B-2 (Continued)

Table B-2
Future Year 2000 Needs Reported in the 1984
Needs Survey (by State)

	Category of Needs							
	Total Needs	I	II	IIIA	IIIB	IVA	IVB	V
Alabama	1255	377	111	92	2	380	293	0
Alaska	358	178	0	5	0	22	147	6
Arizona	955	465	72	10	1	219	188	0
Arkansas	675	306	54	31	2	144	138	0
California	6866	2618	141	352	485	1771	966	533
Colorado	472	275	25	5	1	28	122	16
Connecticut	2031	474	91	18	21	744	226	457
Delaware	313	27	2	5	5	41	44	189
Dist. of Columbia	305	99	174	0	0	0	0	32
Florida	5582	1834	355	121	19	1782	1468	3
Georgia	1701	457	217	69	16	351	416	175
Hawaii	656	191	0	0	20	334	111	0
Idaho	396	161	12	6	3	135	71	8
Illinois	4481	807	326	172	39	197	325	2615
Indiana	2271	401	138	22	3	297	150	1260
Iowa	1193	485	99	65	2	130	240	172
Kansas	984	229	1	21	23	113	336	261
Kentucky	2022	378	116	83	6	660	571	208
Louisiana	1645	606	31	88	19	478	423	0
Maine	1003	190	2	23	10	242	135	401
Maryland	1576	307	620	59	59	263	242	26
Massachusetts	5079	1505	123	36	21	970	917	1507
Michigan	3834	1344	285	40	101	601	706	757
Minnesota	1670	520	138	20	21	157	281	533
Mississippi	827	341	98	61	1	130	196	0
Missouri	3500	1157	5	51	282	318	624	1063
Montana	89	23	2	1	1	27	34	1
Nebraska	317	194	0	1	1	30	74	17
Nevada	201	94	39	3	3	30	32	0
New Hampshire	1250	288	8	9	5	352	356	232
New Jersey	5066	2474	169	187	81	354	581	1220
New Mexico	214	117	1	0	1	45	50	0
New York	15988	3499	271	193	1563	2782	1326	6354
North Carolina	1799	357	121	101	1	566	652	1
North Dakota	47	25	0	0	0	6	8	8
Ohio	5233	929	627	103	242	734	1313	1285
Oklahoma	670	298	87	13	11	116	145	0
Oregon	1315	163	29	81	19	343	220	460
Pennsylvania	5104	1474	321	15	3	1427	381	1483
Rhode Island	827	147	14	1	40	194	103	328
South Carolina	1468	409	59	78	0	393	529	0
South Dakota	153	74	20	1	1	4	28	25
Tennessee	2492	516	119	163	12	555	494	633
Texas	4901	2063	272	233	18	749	1566	0
Utah	735	426	94	45	0	79	91	0
Vermont	295	80	31	4	7	64	20	89
Virginia	1716	670	81	19	2	480	288	176
Washington	3895	1299	23	129	90	838	834	682
West Virginia	2152	452	22	5	3	792	240	638
Wisconsin	1932	648	38	54	7	228	767	190
Wyoming	67	44	8	1	0	2	12	0
American Samoa	63	25	0	0	0	7	31	0
Guam	42	24	0	2	1	7	8	0
Mariana Islands	102	17	1	0	0	53	31	0
Puerto Rico	2292	478	6	27	15	1298	447	21
Trust Territories	136	70	1	0	0	36	29	0
Virgin Islands	50	17	0	1	0	22	10	0
TOTAL	112261	33126	5700	2925	3289	23120	20036	24065

Appendix C

Summary of Current and Future Treatment Plants and Collection Systems Information

NOTE:

Due to the strong emphasis on documenting needs and improving cost estimates, some States did not update all of the technical data used to generate Tables C-1 through C-9.

Table C-1

**Number of Operational Treatment Plants and Collection Systems
in 1986 (by State)**

Table C-1 summarizes the number of facilities in operation in 1986. This summary gives the number of treatment facilities and collection systems in each State and U.S. Territory.

Table C-1

Number of Operational Treatment Plants and Collection Systems
in 1986 (by State)

	Treatment Plants	Collection Systems		Treatment Plants	Collection Systems
Alabama	231	275	New Jersey	222	500
Alaska	45	52	New Mexico	102	113
Arizona	117	133	New York	466	858
Arkansas	288	311	North Carolina	501	586
California	576	774	North Dakota	291	293
Colorado	275	336	Ohio	681	856
Connecticut	103	139	Oklahoma	498	513
Delaware	20	35	Oregon	202	247
Dist. of Columbia	1	1	Pennsylvania	663	1243
Florida	255	325	Rhode Island	20	31
Georgia	388	490	South Carolina	225	288
Hawaii	30	35	South Dakota	270	272
Idaho	149	168	Tennessee	235	261
Illinois	724	965	Texas	1291	1554
Indiana	358	402	Utah	97	153
Iowa	684	714	Vermont	91	100
Kansas	567	577	Virginia	242	323
Kentucky	223	274	Washington	245	308
Louisiana	318	354	West Virginia	171	243
Maine	104	164	Wisconsin	572	720
Maryland	158	213	Wyoming	108	115
Massachusetts	112	204	American Samoa	2	2
Michigan	371	603	Guam	7	7
Minnesota	509	635	Mariana Islands	2	2
Mississippi	303	349	Puerto Rico	33	33
Missouri	543	608	Trust Territories	6	6
Montana	160	164	Virgin Islands	4	4
Nebraska	450	516	Total	15438	19604
Nevada	51	56			
New Hampshire	78	101			

Table C-2

**Number of Operational Treatment Plants and Collection Systems
When All Needs Are Met for Documented Facilities (by State)**

Table C-2 shows the number of treatment plants and collection systems that are planned to be in operation when needs are met for facilities documented by the established criteria. A summary is provided for each State and U.S. Territory.

Table C-2

Number of Operational Treatment Plants and Collection Systems
When All Needs Are Met for Documented Facilities (by State)

	Treatment Plants	Collection Systems		Treatment Plants	Collection Systems
Alabama	262	338	New Jersey	150	540
Alaska	53	57	New Mexico	104	115
Arizona	124	149	New York	581	1078
Arkansas	306	355	North Carolina	554	713
California	633	873	North Dakota	296	302
Colorado	273	336	Ohio	759	1067
Connecticut	107	165	Oklahoma	496	524
Delaware	21	40	Oregon	219	276
Dist. of Columbia	1	1	Pennsylvania	804	1525
Florida	258	394	Rhode Island	21	33
Georgia	337	497			
Hawaii	34	45	South Carolina	220	333
Idaho	178	202	South Dakota	274	277
Illinois	813	1108	Tennessee	278	342
Indiana	415	492	Texas	1447	1752
Iowa	703	748	Utah	108	180
Kansas	571	597	Vermont	100	114
Kentucky	279	353	Virginia	262	394
Louisiana	409	503	Washington	256	339
Maine	146	182	West Virginia	369	556
			Wisconsin	612	823
Maryland	211	296			
Massachusetts	143	251	Wyoming	107	117
Michigan	440	750	American Samoa	2	2
Minnesota	562	696	Guam	6	7
Mississippi	292	407	Mariana Islands	4	4
Missouri	560	678	Puerto Rico	31	34
Montana	176	181	Trust Territories	11	11
Nebraska	448	517	Virgin Islands	3	4
Nevada	57	63			
New Hampshire	94	125	Total	16980	22861

Table C-3**Number of Treatment Plants by Flow Range**

Table C-3 is a summary by flow range of all treatment plants in operation in 1986, as well as those projected to be in operation when all needs are met for facilities documented by the established criteria.

This table gives four flow ranges in millions of gallons per day (mgd) for 1986 and the design year; the number of plants in each range; and the cumulative total of their design flow capacities. These data are for all types of treatment plants, regardless of their level of treatment. Other tables in this Appendix provide summaries by level of treatment for both existing and projected plants.

Table C-3
Number of Treatment Plants by Flow Range

<u>Treatment Plants in Operation in 1986</u>		
<u>Flow Ranges</u> <u>(mgd)</u>	<u>Number of Plants</u>	<u>Flow Capacity</u> <u>(mgd)</u>
0.01 to 0.10	4960	251
0.11 to 1.00	7003	2671
1.01 to 10.00	2898	9372
10.01 and greater	<u>577</u>	<u>24383</u>
Total	15438	36677

<u>Treatment Plants Projected to be in Operation</u> <u>When Needs Are Met for Documented Facilities</u>		
<u>Flow Ranges</u> <u>(mgd)</u>	<u>Number of Plants</u>	<u>Flow Capacity</u> <u>(mgd)</u>
0.01 to 0.10	5664	287
0.11 to 1.00	7430	2763
1.01 to 10.00	3191	10389
10.01 and greater	<u>695</u>	<u>29584</u>
Total	16980	43023

Table C-4**Treatment Plant Information by Level of Treatment**

Table C-4 summarizes the degree of treatment received by all wastewater collected in the United States in 1986 and the degree of treatment projected to be received when all needs are met for facilities documented by the established criteria. This summary provides details on the number of plants and their associated flow by level of treatment. All flow values are given in millions of gallons per day (mgd).

Definitions of the levels of treatment (no discharge, primary, secondary, etc.) are given in subsequent tables that summarize each individual level of treatment.

Table C-4**Treatment Plant Information by Level of Treatment**

<u>Treatment Plants in Operation in 1986</u>			
<u>Level of Treatment</u>	<u>Number of Facilities</u>	<u>Design Capacity (mgd)</u>	<u>Average Daily Flow in 1986 (mgd)</u>
Less than Secondary	2112	5529	4580
Secondary	8403	15714	12140
Greater than Secondary	3115	14373	10364
No Discharge	1762	973	608
Other*	<u>46</u>	<u>88</u>	<u>NA</u>
Total	15438	36677	27692

Treatment Plants Projected to be in Operation
When All Needs Are Met for Documented Facilities

<u>Level of Treatment</u>	<u>Number of Facilities</u>	<u>Design Capacity (mgd)</u>
Less Than Secondary	45	387
Secondary	9675	18844
Greater Than Secondary	4906	21996
No Discharge	2273	1686
Other*	<u>81</u>	<u>110</u>
Total	16980	43023

*Note: Level of treatment and design capacity data were unavailable for these facilities.

Table C-5**Treatment Plant Operational Data in 1986 and When All
Needs Are Met for Documented Facilities**

Table C-5 summarizes information pertaining to pollutant loadings, removal efficiencies, and discharge rates for all treatment plants in operation in 1986 as well as for when all needs are met for facilities documented by the established criteria. This table gives estimates of the overall average daily pollutant loads received by all treatment plants, and the quantities of pollutants in the effluent of facilities discharging to rivers and streams. Also summarized are the number of people now served and those projected to be served in the future.

This summary represents the national average of operational data for all treatment plants without regard to the level of treatment provided. National summaries for the performance of plants by specific levels of treatment are provided in subsequent tables.

All flow values are given in millions of gallons per day (mgd), and all pollutant removal values are given in tons per day (tpd).

Table C-5**Treatment Plant Operational Data in 1986 and When All
Needs Are Met for Documented Facilities**

	<u>1986</u>	<u>When all Identified Year 2005 Needs Are Met</u>
Number of Treatment Plants	15,438	16,980
Number of People Served	172,205,000	243,723,000
Percent of the Nation	73.1	86.6
 <u>Removal Efficiencies*</u>		
Flow (mgd)	27,692 mgd	43,023 mgd
Influent BOD5	23,220 tpd	38,558 tpd
Effluent BOD5	3,705 tpd	3,889 tpd
Percent Removal	84.0	89.9
Influent Solids	26,270 tpd	40,995 tpd
Effluent Solids	3,593 tpd	4,544 tpd
Percent Removal	86.3	88.9

*Facilities with no discharge or raw discharge are not included.

Table C-6

Number of Treatment Plants Not Meeting Secondary Requirements

Table C-6 summarizes information for wastewater treatment plants that are not meeting the secondary requirements defined in the Clean Water Act. These plants are designed to achieve less than secondary treatment.

Treatment plants included in this summary provide either no treatment (raw discharge), primary treatment, or advanced primary treatment. Primary and advanced primary treatment generally include unit processes such as comminution, screening, grit removal, and primary sedimentation. Advanced primary treatment facilities may provide some biological treatment, but are unable to treat wastewater to the degree necessary to comply with EPA's previous definition of secondary treatment (i.e., 30 mg/l BOD and 30 mg/l suspended solids). Facilities that may be able to meet the EPA's revised definition of secondary treatment are included in Table C-6. Both primary and advanced primary plants are included under the "less than secondary" portion of this table.

Some facilities collect wastewater and discharge it as raw waste to the environment. The wastewater is not subjected to any treatment beyond what is considered preliminary treatment. Preliminary treatment includes comminution, screening, grit removal, etc., but not primary sedimentation. When the needs are met for documented facilities, these communities will have constructed treatment facilities or interceptors to neighboring facilities to eliminate the raw discharge.

All flow values are given in millions of gallons per day (mgd), and all pollutant removal values are given in tons per day (tpd).

Table C-6
Number of Treatment Plants Not Meeting Secondary Requirements

<u>Raw Discharge</u>	<u>1986</u>	<u>When All Needs Are Met</u>
Number of Communities	149	0
Number of People Served	1605000	0
Percent of the Nation	0.7	0
 <u>Removal Efficiencies</u>		
Not applicable. There is no treatment, therefore, no removal efficiency can be calculated.		
<u>Less Than Secondary Treatment</u>	<u>1986</u>	<u>When All Needs Are Met for Documented Facilities</u>
Number of Treatment Plants	2112	45*
Number of People Served	28815000	2887000
Percent of the Nation	12.2	0.01
 <u>Removal Efficiencies</u>		
Flow	4580 mgd	387 mgd
Influent BOD5	4325 tpd	349 tpd
Effluent BOD5	1834 tpd	99 tpd
Percent Removal	57.5	71.6
Influent Solids	4722 tpd	356 tpd
Effluent Solids	1424 tpd	92 tpd
Percent Removal	69.8	74.2

* These treatment plants have applied for a waiver from the secondary treatment requirements in accordance with section 301(h) of the Clean Water Act. All have received at least tentative approval.

Table C-7**Number of Treatment Plants Meeting or Exceeding Secondary Requirements**

Table C-7 summarizes the information for wastewater treatment plants that are designed to meet or exceed the secondary treatment requirements of the Clean Water Act. Secondary treatment plants generally include some type of preliminary treatment process followed by a biological process (trickling filter, activated sludge, rotating biological contactor, etc.) with no additional treatment processes, except disinfection.

Advanced treatment plants include facilities that are capable of consistently producing effluent BOD and suspended solids concentrations that are more stringent than 30 mg/l or that have specific processes that can remove phosphorus or ammonia in excess of the amounts normally removed by secondary treatment.

Table C-7**Number of Treatment Plants Meeting or Exceeding Secondary Requirements**

<u>Secondary Treatment</u>	<u>1986</u>	<u>When All Needs Are Met for Documented Facilities</u>
Number of Treatment Plants	8403	9675
Number of People Served	72285000	107391000
Percent of the Nation	30.7	38.2
<u>Removal Efficiencies</u>		
Flow	12140 mgd	18844 mgd
Influent BOD5	10378 tpd	18553 tpd
Effluent BOD5	1279 tpd	2364 tpd
Percent Removal	87.6	87.2
Influent Solids	10989 tpd	19155 tpd
Effluent Solids	1478 tpd	2726 tpd
Percent Removal	86.5	85.7
<u>Better Than Secondary Treatment</u>	<u>1986</u>	<u>When All Needs Are Met for Documented Facilities</u>
Number of Treatment Plants	3115	4906
Number of People Served	54935000	85831000
Percent of the Nation	23.3	30.5
<u>Removal Efficiencies</u>		
Flow	10364 mgd	21996 mgd
Influent BOD5	8514 tpd	19560 tpd
Effluent BOD5	595 tpd	1377 tpd
Percent Removal	93.0	93.0
Influent Solids	10556 tpd	21276 tpd
Effluent Solids	691 tpd	1694 tpd
Percent Removal	93.4	92.0

Table C-8
Number of Nondischarging Treatment Plants

Table C-8 summarizes information for wastewater treatment plants that are designed to be nondischarging, i.e., treated wastewater is not discharged to any stream or river. The majority of the nondischarging plants are lagoon systems designed to dispose of the total flow they receive by means of evaporation or percolation to groundwater. Also included are plants that dispose of their effluent by recycling, reuse, spray irrigation or other land disposal, or groundwater recharge.

All flow values are given in millions of gallons per day (mgd), and all pollutant removal values are given in tons per day (tpd).

Table C-8
Number of Nondischarging Treatment Plants

<u>Nondischarging Treatment Plants</u>	<u>1986</u>	<u>When All Needs are Met for Documented Facilities</u>
Number of Treatment Plants	1762	2273
Number of People Served	5679000	10858000
Percent of the Nation	2.4	3.9
<u>Removal Efficiencies</u>		
Flow	608 mgd	1686 mgd
Influent BOD5	558 tpd	1548 tpd
Effluent BOD5	0 tpd	0 tpd
Percent Removal	100	100
Influent Solids	558	1548
Effluent Solids	0	0
Percent Removal	100	100

Table C-9**Projected Changes for Treatment Plants**

Table C-9 summarizes the dollar needs identified for changes to treatment plants that were operational in 1986, plus the dollar needs for new plants projected to be built when all needs are met for facilities documented by the established criteria.

The table is divided into two sections. The first section details planned changes and related costs for all treatment plants operational in 1986. The second section summarizes the number of new plants (and their identified costs) projected to be built when needs are met for facilities documented by the established criteria.

Table C-9
Projected Changes for Treatment Plants

<u>Changes for Treatment Plants Operational in 1986</u>		
<u>Type of Change</u>	<u>Number of Plants</u>	<u>Identified Needs (millions)</u>
Enlargement	958	\$4729
Upgrade	1455	3630
Enlarge and Upgrade	1598	8877
Replace	736	1355
Abandon	1035	120
Other	627	4090
No Change	9029	116
Total	15438	\$22917
<u>New Treatment Plants Projected to be Built When All Needs Are Met for Documented Facilities</u>		
<u>Level of Treatment</u>	<u>Number of Plants</u>	<u>Identified Needs (millions)</u>
Secondary	1582	\$2040
Greater Than Secondary	341	601
No Discharge	634	1155
Total	2557	\$3796

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