Drinking Water Infrastructure Needs Survey and Assessment
Third Report to Congress

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APPENDIX A—PAYING FOR AND FINANCING INFRASTRUCTURE IMPROVEMENTS

Paying for Infrastructure Improvements

The 2003 Drinking Water Infrastructure Needs Survey and Assessment shows that the nation's public drinking water systems need to invest $276.8 billion over the next 20 years to continue providing water that is safe to drink. Investments of $165 billion are required to meet current needs. Given the size of the estimated needs, how will utilities pay for these infrastructure improvements?

Although much of a water system's needs are met through consumer's rates, this funding does not always cover the full cost of major capital investments. For this reason, local, state and federal programs have been developed to help fill the gap.

The 1996 Safe Drinking Water Act (SDWA) Amendments created the Drinking Water State Revolving Fund (DWSRF). The purpose of this program is to provide low-cost loans to drinking water systems. Federal assistance to systems regulated by states comes in the form of "capitalization grants" to the states. This "capital" is used by the states to start the revolving loan funds. As loans are paid off, money becomes available for re-lending. Congress has appropriated more than $6.96 billion for the DWSRF from FY1997 through FY2004.

In addition to EPA, other federal agencies have low-interest loan or grant programs. The largest of these programs is provided by the Department of Agriculture through its Rural Utilities Service (RUS), which received appropriations of $1.3 billion in FY2003 for both water and wastewater projects. The second-largest program is provided by the Department of Housing and Urban Development (HUD) through its Community Development Block Grants; total disbursements for both water and wastewater in FY2003 amounted to $479 million. Finally, the Economic Development Administration (EDA) in the Department of Commerce provides funds for physical infrastructure, including water and wastewater systems.

Many states also provide loans and grants to water utilities from monies that their own legislatures have appropriated. Some of these are coordinated with DWSRF capitalization grants. State funds (through matching appropriations, leveraged bonds, principal loan repayments, or interest) account for 42 percent of the funds available through the DWSRF. Other loans and grants may be coordinated with other available federal assistance (including RUS, HUD, and EDA).

As the Congressional Budget Office (CBO) noted, "Ultimately, society as a whole pays 100 percent of the costs of water services, whether through ratepayers' bills or through federal, state, and local taxes."[19]

[19] Congressional Budget Office, *op. cit.*, page ix.

Reducing the Cost of Infrastructure

In 2002, EPA issued a report identifying that over the next 20 years a significant funding gap could emerge between clean water and drinking water infrastructure investment needs and current levels of spending. The following year, a national meeting was held entitled, "Closing the Gap: Innovative Responses for Sustainable Water Infrastructure," where participants recognized that current spending and operational practices would need to change in order to avoid the emergence of a funding gap that would hamper efforts to provide future safe drinking water. The participants further recognized that federal funding is and will remain limited; initiatives to adequately address the potential emerging gap will need to be based on improved management and water conservation as methods for reducing the cost of infrastructure.

The concept of "sustainable infrastructure," announced at the January 2003 meeting, consists of "four pillars":

- **Full Cost Pricing of Water.** There are strong economic arguments for shifting more of the cost of water from taxes to rates, and they are closely linked with smart water use. If consumers pay the full cost of water, and if this results in higher rates, then the rate will send an appropriate "price signal" to consumers and encourage conservation. The CBO recently estimated that future infrastructure investment needs could be paid by ratepayers, and that this investment would increase water bills from 0.5 percent of income to 0.9 percent of income, on average.[20] If these rate increases create problems for low-income or fixed-income households, a wide variety of mechanisms are available to mitigate the impacts, such as rate reductions or local subsidies to these households in the form of "life-line" water rates.

- **Better Management.** There are proven management methods to reduce the cost of providing safe drinking water and improving performance. One of these is **asset management**. This is a data-driven approach to prioritizing investments in infrastructure so that they meet customer expectations. Armed with detailed information on the age, condition, and performance of infrastructure, systems would be able to replace infrastructure as needed to meet performance standards. This would optimize investment. Savings from asset management approaches are estimated to be 10 percent of the capital investment. Ten percent of the estimated infrastructure needs in this assessment ($276.8 billion) would be $27.7 billion over 20 years, or $1.38 billion per year—more than the current federal contribution in capitalization grants through the DWSRF. A related concept is **environmental management systems** (EMS). These are comprehensive assessments of the utility's operations for continual improvement in operations, resulting in better performance and lower cost.

- **Efficient Water Use.** Much of the needed investment reported in EPA's Needs Assessment consists of installing new distribution pipe, treatment, or storage to meet the needs of the existing U.S. population. These projects are sized to accommodate reasonably anticipated growth. Decreasing water use, however, might reduce the projected increase in design capacity, thereby reducing investment needs. EPA estimates that there could be a 20 percent reduction in water use if simple conservation methods were introduced. This may translate to smaller capacity plants, which in turn would have reduced capital and operating costs.

[20] *Ibid.*, page xvi.

- **Watershed Approach.** There is great potential for cost savings in what EPA has broadly described as the "watershed approach" to management. This term refers to policies that include broad stakeholder involvement, hydrologically defined geographic boundaries, and coordinated management across all policies that affect water. Specific practices may include incentives for pollutant reduction, purchase of easements to minimize or eliminate pollutant sources, and conversion of land uses where such approaches are cost effective.

No single initiative will answer the question of how to pay for the infrastructure needs identified in this assessment. Yet, each has great potential, and none has been fully exploited. Taken together, and used in a coordinated fashion with the significant levels of financial assistance available at the federal and state levels, they provide an outline of how to pay for these infrastructure needs.

Montana Department of Environmental Quality

Regional water systems serving rural areas require long lengths of mains per household served. The Fort Peck-Dry Prairie Regional Water System in northwest Montana serves a population of 25,000, but will have over 3,200 miles of pipe.

APPENDIX B—METHODS: SAMPLING AND COST MODELING

Survey Design

EPA's 2003 Needs Assessment relied on a survey to determine the needs for medium and large water systems. The survey is based on a random sample of water systems. This section provides an overview of the survey design. A detailed description of the design is in "2003 Drinking Water Infrastructure Needs Survey, EPA ICR #2085.01."

Sample Frame

The first step of the sample design is to develop the sample frame. The sample frame is a list of all members (sampling units) of a population from which a random sample of members will be drawn for the survey. The sample frame is the basis for the development of a sampling plan to select a random sample. To ensure that the survey accounted for all community water systems in the nation, the universe of water systems (from which the samples were drawn) was obtained from the federal Safe Drinking Water Information System (SDWIS-FED). SDWIS-FED is EPA's centralized database for information on public water systems. It includes the inventory of all public water systems in the states and territories from which the states verify information regarding population served, water sources, and other important variables for their systems. For the 2003 Needs Assessment's sample frame database, systems were categorized by source water and population served. Some systems sell water to other water systems; for purposes of the survey, the population of the purchasing systems is included in the seller's population.

EPA sent the sample frame, with the population served and the water sources, to the states for their review and updated it based on the states' comments. The 2003 Needs Assessment excluded systems serving populations of 3,300 or fewer, so these systems were dropped from the list. A sample of systems was then selected from this updated sample frame.

Sample Design

EPA drew separate samples for each of the 50 states, the District of Columbia, and each of the trust territories. The sampling design for the survey was stratified random sampling within each state. In stratified samples, the population is divided into nonoverlapping subpopulations called strata and a simple random sample is taken in each stratum. Stratification may increase the precision of the estimates when the population is divided into subpopulations with similar characteristics within each stratum. Some water systems, as a group, will have different needs than other groups of water systems. For example, large water systems generally require much greater investment than do small systems, and systems that utilize surface water require more treatment (and therefore incur more costs) than systems that utilize ground water. In this assessment, water systems were stratified by source water type and system size based on the population served in each system.

- **Water Source.** Systems were classified as either surface water or ground water systems. Systems that use surface water, even if they also use ground water sources, were classified as a surface water system. All other systems were classified as ground water systems. Systems that rely exclusively on purchasing treated water have very few treatment needs; therefore, their needs are more similar to ground water systems than systems using and treating surface water sources. For this reason, systems that solely purchase water were included in the ground water strata.

- **System Size.** Systems were further stratified by the size of the population served. The size categories varied by state and water source. In some cases, systems were divided into four size categories: 3,301 to 10,000, 10,001 to 40,000, 40,001 to 50,000, and more than 50,000. In other cases, they were divided into five categories: 3,301 to 10,000, 10,001 to 25,000, 25,001 to 40,000, 40,001 to 50,000, and more than 50,000. Five size categories were used if it resulted in smaller sample sizes than four size categories. (Note that the population of purchasing systems was included when systems were assigned to size categories, as described above.) Exhibit B-1 shows the size categories used by different EPA drinking water programs.

Exhibit B-1: Size Category Definitions

Programs	Size Categories				
	Extra Small	Small	Medium	Large	Very Large
2003 Needs Assessment	N/A	≤ 3,300	3,301 - 50,000	> 50,000	N/A
Public Water System Supervision Program	≤ 500	501 - 3,300	3,301 - 10,000	10,001 - 100,000	>100,000
Drinking Water State Revolving Fund	N/A	≤ 10,000	N/A	N/A	N/A

For systems serving populations of 3,301 to 40,000, EPA selected a random sample of systems from each stratum. The target precision for the estimate of the need for each state determined the number of systems selected in each stratum, as described below. The survey sample included 2,553 community water systems serving populations of 3,301 to 40,000 out of the national inventory of 7,337 systems.

Systems serving more than 40,000 people were sampled with certainty. There is a relatively small number of these systems in many states, but they serve a large share of the population and account for a large share of the need. The survey included all of the nation's 1,342 systems serving populations of more than 40,000. At the direction of the workgroup, it was assumed that systems serving more than 40,000 that do not respond to the survey (approximately 4 percent) have no need and do not contribute to the needs of their state.

States were given the option of sampling with certainty the full set of systems serving populations of 3,301 to 40,000, rather than using a random sample of these systems. One state chose this method.

Sample Size Determination

The 2003 Needs Assessment workgroup determined the sample size for each state to achieve the target precision of 95 percent ± 10 percent for each state's estimate of need. The sample size for each state was determined to achieve the target precision set for each state's estimate of need. The sample size was selected so that the state's need would be estimated within 10 percent of the amount of the true need with 95 percent confidence. For example, if the survey estimates indicate a need of $2.0 billion, then there is a 95 percent probability that the interval of $1.8 to $2.2 billion includes the true need. Data from the 1999 Needs Assessment were used to estimate the average need and standard deviation of the need for each state, by stratum. These estimates were then used to calculate the sample size required for each state to meet the precision target. Systems serving populations of 3,301 to 40,000 were oversampled to account for system nonresponse. EPA assumed the response rate would be 90 percent, based on data from the 1999 Needs Assessment. Once the sample size was selected for each state, the number of samples for each stratum was allocated in a way that minimizes the sampling error of the estimate. See Exhibit B-2 for the sample sizes for each state.

Weighting the Systems

EPA weighted the systems serving populations of 3,301 to 40,000 to account for variable probabilities of selection and differential response rates. Weighting the data allows inferences to be made about all systems, not just those included in the sample, but also those not included in the sample or those that did not respond to the survey. For instance, in a given stratum in a given state, one system may be given a base weight of 10. This means that only 1 in 10 systems in this stratum is included in the survey, and the needs of this system represent its own and those of nine other systems.

The base weights and nonresponse adjustments reflect the probability of selection for each system and adjustments for system level nonresponses, respectively. Systems serving more than 40,000 people received a weight of one because they were selected with certainty.

Data Collection

The 3,895 medium and large systems in the survey were mailed a questionnaire package. Systems were asked to identify capital projects needed to protect public health for current customers and for households without access to safe drinking water. The questionnaire prompted systems to provide:

- A description of the infrastructure need
- Documentation explaining why the project is needed
- An indication of whether the project is a current or future need
- An indication of whether the project involves installing new or rehabilitating existing infrastructure
- An indication of whether the project is triggered by a Safe Drinking Water Act (SDWA) regulation
- A documented cost estimate, if available
- Design capacities of projects without costs for cost modeling

Exhibit B-2: Community Water System Sample Sizes

State	Total Number of Systems in Inventory			Number of Systems Selected in Sample		
	Population Served			Population Served		
	3,301-40,000	>40,000	Total	3,301-40,000	>40,000	Total
Alabama	293	45	338	134	45	**179**
Alaska	14	2	16	10	2	**12**
Arizona	77	18	95	26	18	**44**
Arkansas	145	16	161	74	16	**90**
California	432	224	656	32	224	**256**
Colorado	84	19	103	21	19	**40**
Connecticut	42	17	59	11	17	**28**
Delaware	17	6	23	6	6	**12**
District of Columbia	0	1	1	0	1	**1**
Florida	295	92	387	25	92	**117**
Georgia	175	39	214	26	39	**65**
Hawaii	28	3	31	23	3	**26**
Idaho	36	4	40	17	4	**21**
Illinois	402	58	460	71	58	**129**
Indiana	181	19	200	97	19	**116**
Iowa	115	13	128	31	13	**44**
Kansas	72	10	82	16	10	**26**
Kentucky	225	11	236	129	11	**140**
Louisiana	192	17	209	102	17	**119**
Maine	31	1	32	17	1	**18**
Maryland	39	13	52	5	13	**18**
Massachusetts	205	39	244	46	39	**85**
Michigan	245	47	292	33	47	**80**
Minnesota	139	21	160	57	21	**78**
Mississippi	185	6	191	99	6	**105**
Missouri	152	14	166	44	14	**58**
Montana	28	3	31	7	3	**10**
Nebraska	41	3	44	31	3	**34**
Nevada	26	6	32	7	6	**13**
New Hampshire	33	2	35	9	2	**11**
New Jersey	189	35	224	40	35	**75**
New Mexico	46	6	52	12	6	**18**
New York	300	62	362	300	62	**362**
North Carolina	211	29	240	76	29	**105**
North Dakota	25	4	29	19	4	**23**
Ohio	281	34	315	91	34	**125**
Oklahoma	139	11	150	54	11	**65**
Oregon	87	15	102	34	15	**49**
Pennsylvania	259	74	333	55	74	**129**
Puerto Rico	99	23	122	19	23	**42**
Rhode Island	19	8	27	8	8	**16**
South Carolina	131	14	145	66	14	**80**
South Dakota	40	2	42	25	2	**27**
Tennessee	235	51	286	140	51	**191**
Texas	697	99	796	72	99	**171**
Utah	77	17	94	11	17	**28**
Vermont	30	2	32	15	2	**17**
Virginia	110	31	141	110	31	**141**
Washington	140	25	165	36	25	**61**
West Virginia	95	8	103	58	8	**66**
Wisconsin	147	16	163	80	16	**96**
Wyoming	22	4	26	17	4	**21**
American Samoa	0	1	1	0	1	**1**
Guam	3	1	4	3	1	**4**
Northern Mariana Is.	4	1	5	4	1	**5**
Virgin Islands	2	0	2	2	0	**2**

Systems returned the completed questionnaires to the states for review, along with the supporting need and cost documentation. The states reviewed each questionnaire to ensure that systems thoroughly identified their needs and that all projects were documented and described correctly. The states had the option of providing supplemental information if documentation of need or cost was inadequate. In many instances, the states contacted the systems to obtain additional information. The states then forwarded the questionnaires to EPA for final review. EPA reviewed each project for Drinking Water Infrastructure Needs Survey and Assessment eligibility criteria, conformance to workgroup policies, adequacy of documentation of need, and documentation of reported costs. EPA accepted or edited project information accordingly and coded each deficiency or change made to each project. Once EPA's review was completed, the questionnaires were entered into a database. This database was made available on the Internet to provide states with a final opportunity to review their systems' data and provide additional information regarding the changes or deficiencies recorded by EPA.

EPA's review process in 2003 has evolved from the procedures used in 1995 and 1999. Although some states were involved in data collection for the 1995 Needs Assessment, EPA assumed primary responsibility for reviewing needs and, whenever necessary, contacting systems to obtain further documentation. The greater involvement of the states—with their familiarity with the systems—accounts in part for the larger number of projects received for the 1999 Needs Assessment. In 2003, the states were given more extensive training by EPA and more responsibility for the review of the surveys. For this assessment, the number of projects as well as total need increased significantly. This increase is believed to be a much more complete and accurate representation of the nation's total water system capital needs.

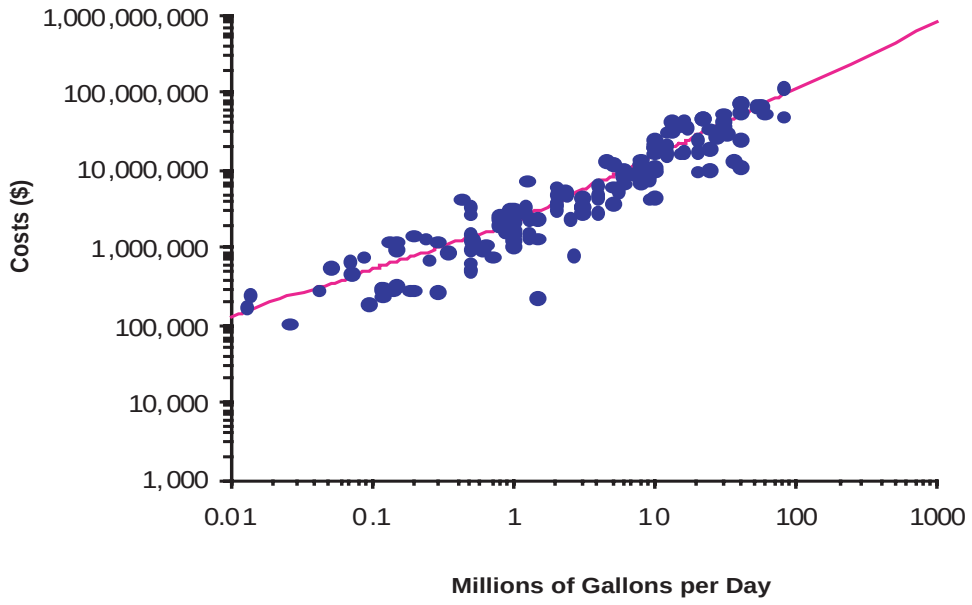
Estimating Needs of Water Systems

Estimating Needs for Large and Medium Community Water Systems

Each system that responded to the survey provided information regarding each of its investment needs. The sample included data on 128,600 infrastructure projects. Some of the medium and large drinking water systems provided capital improvement plans or engineering reports to document the costs of their infrastructure projects. However, approximately 82 percent of the projects lacked cost estimates. EPA used models to assign costs to these projects. For the most part, EPA developed the cost models from the 1999 Needs Assessment and adjusted the costs to 2003 dollars to estimate current costs. EPA developed two new models for the cost of installing and rehabilitating pipe and a third model for installation of domestic meters. New models were needed for pipe installation and rehabilitation because the models had not been updated since the 1995 Needs Assessment. A new model was needed for service meters because generally accepted technology had changed from manual-read to radio-read meters. All costs provided by systems or modeled by EPA were converted to January 2003 dollars.

Exhibit B-3 provides an example of a cost curve used to apply costs to a new conventional treatment plant project. A cost model would have been used if a system knew that it needed to rehabilitate a conventional filtration treatment plant that no longer met performance standards but did not have documentation of cost. If the system provided the design capacity of the plant on the questionnaire, EPA would have applied the specific cost model for rehabilitating this type of plant.

Exhibit B-3: Conventional Treatment Plant Project Cost Curve



The investment need for each system in the sample was estimated based on the reported and modeled costs of each project in the sample. The total need for medium and large systems was then estimated for each state by applying the sample weights to the total need for each system. The need for each system was multiplied by the sample weights; this product was then summed across all systems to produce the total need for medium and large systems in each state.

Estimating Needs for Small Community Water Systems

EPA estimated small system need based on the findings of the 1999 Needs Assessment. The 1999 Needs Assessment collected data on a national sample of small systems. These needs were adjusted to January 2003 dollars using a factor of 1.097 and apportioned among the states based on the inventory of small systems. EPA believes that the 1999 data are credible because they were collected through EPA site visits by water system specialists who had extensive experience working with small systems, and who received training in the project eligibility and documentation criteria established for the survey.

Estimating Needs for American Indian, Alaska Native, and Not-for-Profit Noncommunity Water Systems

EPA estimated needs for American Indian, Alaska native village, and not-for-profit noncommunity water systems based on the findings of the 1999 Needs Assessment. In 1999, EPA conducted site visits or provided assistance in completing the questionnaire to all American Indian systems, Alaska native village systems, and to a sample of approximately 100 not-for-profit noncommunity water systems. Data collection and cost

modeling were completed using the same methods applied to small community water systems. The needs calculated from the 1999 data were adjusted to January 2003 dollars for the 2003 Needs Assessment effort.

Estimating Costs for Proposed and Recently Promulgated Regulations

A portion of the needs collected in the 2003 Needs Assessment are attributable directly to SDWA regulations. Systems were able to identify projects needed for compliance with existing regulations. However, most systems had not yet identified the infrastructure needed to comply with proposed and recently promulgated regulations. Consequently, the need for complying with these regulations was based on the Economic Analysis (EA) that EPA presents when proposing or finalizing each regulation. The 2003 Needs Assessment did not include the costs of regulations that were proposed after August 2003.

The costs associated with most future and recently promulgated regulations are included in the total national need only, not allocated at the state level. In general, the use of EAs to allocate these costs to each state is problematic, given that the cost of a regulation is not necessarily a direct function of the number of systems in each size and source category. The cost of compliance with a new regulation will vary significantly from state to state if the contaminant occurs mostly in specific regions of the country. Allocating costs based solely on the inventory of systems would fail to capture this variation.

However, the recently promulgated Arsenic Rule is somewhat different in that many states did have occurrence data for the number of systems with arsenic over 10 parts per billion. Therefore, the total national cost of complying with the recently promulgated Arsenic Rule was taken from the EA and allocated to each state based on these occurrence data.

APPENDIX C—SUMMARY OF QUALITY ASSURANCE PROCEDURES

Information Quality

The 2003 Needs Assessment followed the Agency's Guidelines for Ensuring and Maximizing Information Quality.[21] EPA's goal is to ensure the quality, objectivity, utility, and integrity of information disseminated by the Agency. The Agency developed the guidance document to incorporate the government-wide guidelines issued by the Office of Management and Budget (OMB) pursuant to section 515 of the Treasury and General Government Appropriations Act of 2001.[22] Information quality is particularly important when the Agency disseminates the results of research, and where those research results lead to policy decisions. Because the results of the 2003 Needs Assessment will be used to allocate Drinking Water State Revolving Fund (DWSRF) capitalization grants, data quality is critical.

Quality Systems: The cornerstone for maximizing information quality is the Agency's Quality System. All EPA Offices, and all contractors working for EPA, have Quality Management Plans (QMPs) that outline detailed procedures for quality assurance and quality control. The specific procedures required for each project are documented in a quality assurance project plan (QAPP). The plan outlines all of the steps that the project team will follow to ensure that quality is built into the project from the start. Since the 2003 Needs Assessment was similar to the Needs Assessments of 1999 and 1995, the QAPP included all lessons learned from the previous research.

The most important task at the start of each project is the definition of data quality objectives (DQOs). These define the policy decisions that will result from the research and the precision targets for data collection. The DQOs for this project were established for the 1995 Needs Assessment and, with some slight modifications, these DQOs remained the same for the 2003 Needs Assessment. The primary DQO for the 2003 Needs Assessment was to maximize precision of the estimates of state needs. The specific precision requirement for each state was that the maximum half-width of the 95 percent confidence interval estimate of the total need was to be no more than ± 10 percent of the total need for each state. Since the 2003 Needs Assessment relied on a survey of a random sample of systems, the precision target for the survey was defined in terms of acceptable sampling error. For more information on the sample design and the quality assurance procedures for the sample frame, see Appendix B.

A distinctive feature of the Needs Assessments is that important questions are decided by a state/EPA workgroup that meets regularly throughout the project. At the start of the 2003 Needs Assessment, the workgroup met to review the lessons learned from the last assessment. The workgroup reaffirmed the DQOs, and made suggestions for improvements in data collection for 2003. One problem identified in 1995 and 1999 was an apparent underreporting of needs. This was addressed explicitly in the 2003 Needs Assessment approach. The workgroup recommended:

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[21] U.S. Environmental Protection Agency, Guidelines for Ensuring and Maximizing the Quality, Objectivity, and Integrity of Information Disseminated by the Environmental Protection Agency, EPA/260r-02-008 (October 2002).

[22] *Federal Register*, Vol. 67, No. 36, February 22, 2002, pp. 8452-8460.

- Changes in the questionnaire that would force systems to think more comprehensively about their needs, including those not covered in existing capital improvement plans (CIPs), and

- Revised and enhanced training for state coordinators for their increased role in 2003 (assisting systems, reviewing questionnaires, and tracking questionnaires through the review process).

In addition, the 2003 Needs Assessment workgroup used quality assurance techniques that had worked well in previous surveys. Recognizing that one of the largest potential sources of error in a sample survey is nonresponse, EPA took steps to ensure high response rates. These steps included the following:

- Questionnaires were shipped with a prepaid return envelope via Federal Express,[23] enabling EPA to track the shipments.

- EPA made available a toll-free telephone helpline (operated by an EPA contractor) to answer questions about the questionnaire.

- The contractor electronically tracked all questionnaires and provided lists of nonrespondents to the states for follow-up.

- EPA contacted utility organizations and specific systems, as requested by states, to encourage participation.

The result of these efforts was a 96 percent response rate to a mail survey.

EPA designed several procedures to ensure quality control of the data collected by the questionnaires.

- The first step was intensive training of all professionals who were involved in the review of questionnaires. It was critical that all personnel (EPA, state, and contractor) have a shared understanding of the objectives of the data collection. All personnel also needed detailed training in the completion of the questionnaires and use of the project coding.

- Systems sent their completed questionnaires to their state coordinators. This gave the states an opportunity to review the questionnaires, request additional information, and make corrections based on their knowledge of the systems.

- The states then sent the questionnaires to EPA's contractor, The Cadmus Group, Inc., who also had provided technical support to the Needs Assessments in 1995 and 1999. Cadmus professional staff reviewed the questionnaires to ensure that they met agreed-upon survey policies and quality standards. One critical objective of this review was to eliminate all unallowable or undocumented needs. Another was to ensure data were coded correctly and were consistent with each project's documented purpose, scope and cost. Changes made at this stage of review were coded so that states could see the rationale for these changes.

[23] In response to an inquiry in 1995, EPA calculated the costs and benefits of using Federal Express versus the U.S. Post Office. Given the rate structure that EPA had negotiated with Federal Express, EPA demonstrated that this was cheaper and more effective.

- After this initial contractor review, the questionnaires were forwarded to a senior Cadmus professional. The purpose of this level of review was to ensure quality control of all contractor work.

- Cadmus personnel also did in-depth reviews of the first five questionnaires submitted by each state, including a telephone conference call with state personnel. This enabled Cadmus to talk through any problems with the questionnaires so that corrections could be made in state review processes. These interactions with states were enhanced by regular telephone conference calls with the state/EPA workgroup where state concerns could be resolved in a collaborative process.

After the review, the contractor entered the information from the questionnaires into a data system. The data entry process used an automated program keyed to the questionnaire, which precluded any invalid entry for each question. To further assure quality, the program included 100 percent verification using double key entry.

During all of these steps, the contractor used an electronic tracking system to track the progress of the questionnaires. Each time the questionnaire changed hands, from the time it was mailed out through each review step and data entry, the contractor knew exactly who had the document. This information also was shared with the states though a dedicated Web site. The states knew the status of each questionnaire. They could see changes that had been made during the review process, and they had an opportunity to modify project information through the Web site, by fax, or by mail. All modifications made by reviewers were coded to create a record that explained all changes.

Quality control of the database consisted of several steps. The first step was automated computer edits looking for out-of-range values for any variable. The second step was automated logic edits. Some of these tests looked for extreme values for specific variables (e.g., a small system that reported it needed to replace 10,000 miles of distribution pipe, probably meant to report 10,000 feet of pipe). Other automated tests focused on relationships between variables. For example, if a system purchased all of its water, it would be unlikely to have a major treatment plant.

Variables that failed any of these tests were identified in a report, and a data supervisor was able to examine the original questionnaire to determine whether the anomaly occurred in the original data. If the anomaly was in the questionnaire, then questions could be posed to the state.

As in past assessments, EPA clearly defined the concept of “eligible infrastructure” in the questionnaires and training. EPA also used quality control procedures to rigorously enforce that definition when reviewing project documentation. For a project to be included in the 2003 Needs Assessment, documentation describing its purpose and scope had to accompany each need. The documentation was reviewed by EPA to determine whether the projects submitted for the 2003 Needs Assessment met the eligibility criteria for DWSRF funding and allowability criteria set for the 2003 Needs Assessment. The state/EPA workgroup established the documentation requirements so that uniform criteria were applied to all questionnaires. These requirements not only lent credibility to the findings, they also addressed the issue of fairness in using the results to apportion DWSRF funds.

Of the 128,600 projects submitted to the survey, EPA deleted 18 percent that failed to meet the documentation criteria or appeared to be unallowable based on workgroup criteria or ineligibility for DWSRF funding. EPA

adjusted the projects to correct a variety of measurement problems: overlaps between two projects (raising the issue of double-counting), inconsistency with project documentation, and use of overly aggressive infrastructure life cycles by states where system planning documents were not used or available.

To adjust for the use of aggressive infrastructure life cycles in estimating need, EPA made technical adjustments to individual projects based on engineering literature and benchmarks of engineering practices. The adjustments were tailored to the unique assumptions implemented by each state and were negotiated with state officials. The general direction of these adjustments was to place a cap on the state's assumptions about the rate of rehabilitation and replacement of pipe, unless there was project-specific documentation of a need provided by the water system.

Internal and External Review: A June 7, 1994 EPA policy makes it clear that peer review should be part of the design of any research project. In fact, the policy states that "peer review at the planning stages can often be extremely beneficial." The 2003 Needs Assessment is the third in a series of assessments that EPA performed (every 4 years) since 1995. Peer review has been part of the planning process from the very beginning. Continued external review, provided by the state/EPA workgroup, was essential in ensuring that the research met its intended quality objectives.

EPA sought external review of its approach to the first Needs Assessment in 1995. Since the 2003 Needs Assessment was a major data-collection project that required substantial efforts from water systems and states, EPA distributed its study approach to industry and professional associations. These organizations provided helpful criticism of the approach, which led to changes in the study design. Because the results of the assessments have a direct impact on states (through the allocation of DWSRF capitalization grants), the Agency has consulted regularly with a workgroup composed of federal and state personnel. Since 1995, state personnel have provided technical reviews of each study's approach, data collection methods, and analysis.

EPA developed the statistical design for the assessment in 1995, in consultation with the workgroup. The workgroup specifically reviewed the critical decision on the proposed level of statistical precision. States, especially, were consulted about their preferences for the level of precision of the state-specific estimates that EPA would use to determine the allocation of DWSRF capitalization grants among them. Upon receipt of the precision targets, EPA developed a statistical design, using the Neyman allocation formula, which would most efficiently achieve those objectives. The entire design was subjected to internal review by statisticians in the Office of Water (OW) and the Office of Regulatory Management and Information (now the Office of Information Analysis and Access in the Office of Environmental Information). The statistical design was further reviewed by specialists in the OMB during the evaluation of the Information Collection Request (ICR) for the study. The statistical design has remained basically the same since 1995; any changes to the design have been noted in the ICRs, which are reviewed by statisticians in EPA and at OMB.

Closely related to the technical approach and statistical design is the QAPP. Consistent with Agency policy on quality assurance, the QAPP is reviewed by an independent quality specialist in OW before work can proceed. The quality assurance process is also the subject of audit by EPA Quality Staff, thereby providing additional internal peer review by experts in quality assurance methods. The QAPP is updated completely at the start of each assessment cycle, and it is amended as necessary during the assessment period.

The results of the 1995 and 1999 Needs Assessments have been critically reviewed by external parties, especially those in the water utility industry[24] and government accounting offices.[25,26] These reviews have been instrumental in the changes to the study design. For example, past Assessments had been criticized for underestimating infrastructure needs, so EPA changed the research design for the 2003 Needs Assessment to correct that problem. Such external reviews, coupled with the ongoing input from the external members of the state/EPA workgroup, provide a continuous source of ideas for improving the quality of each assessment.

Transparency and Reproducibility: EPA's Guidelines on Information Quality explain that influential information (such as this report) "should be subject to a higher degree of quality (for example, transparency about data and methods). Such transparency facilitates reproducibility of this information, and reproducibility should meet commonly accepted standards." The Information Quality guidelines emphasize the importance of transparency in information that is disseminated to the public and used to make policy decisions. EPA believes that transparency is also useful during the research process, especially when state officials are important stakeholders.

The 2003 Needs Assessment (like its predecessors) maintained high standards of transparency. Since 1995, the Needs Assessments have been guided by a state/EPA workgroup that meets regularly throughout the study period. These face-to-face meetings are supplemented by telephone conference calls. Every important decision about the assessments—from the technical approach, questionnaires, data collection methods, and statistical design, to the cost models, analysis of data, and, after submission to Congress, the Report to Congress—is discussed by the workgroup. Decisions generally are made by consensus. A central concern of the workgroup is fairness to all stakeholders.

At the beginning of each new assessment, EPA summarized the lessons learned from the previous assessment. All lessons are rigorously analyzed, including follow-up research to establish a solid record of evidence. These lessons provide a basis for making changes in the technical approach or assessment design. The most important lesson learned in 1999 was an apparent underreporting of needs due in part to limitations of system planning documents. This lesson was addressed by the workgroup and resulted in major changes in the assessment.

EPA has developed and enhanced the methods by which states can review the projects submitted and action taken to ensure its quality during the 2003 Needs Assessment itself. The Agency improved this process for the 2003 Needs Assessment and facilitated states' ability to review information from their systems and to provide comments on those data. The objective was greater transparency in the assessment process.

One area of weakness in the first two Reports to Congress was the lack of sufficient details on the methodology. The details provided in those reports were similar to the information found in the Reports to Congress that had been prepared by the Clean Watersheds Needs Surveys (CWNSs) for two decades. With the issuance of EPA guidelines on information quality, however, it is appropriate for EPA to change the Agency's

[24] American Water Works Association Water Industry Technical Action Fund, Dawn of the Replacement Era: Reinvesting in Drinking Water Infrastructure (Denver, CO: May 2001).

[25] Congressional Budget Office: Future Investments in Drinking Water and Wastewater Infrastructure (Washington, DC: November 2002). This report is particularly useful because it provide a comparative analysis of the methodologies of all studies of infrastructure needs.

[26] United States General Accounting Office: Key Aspects of EPA's Revolving Fund Program Need to be Strengthened, GAO-02-135 (January 2002).

approach and provide greater detail. The ultimate goal is to provide enough information so that a reader who had access to the Needs Assessment database could reproduce the results of the 2003 Needs Assessment.

To ensure that level of transparency, EPA has provided additional detail on the research methods in this Report to Congress. EPA also has referenced, and will make available via the EPA Web site, the technical approach document. That document provides detailed background information on every important research design decision, as well as full details on the statistical methods used to draw a representative sample, and the methods used to create sample weights for data analysis.

APPENDIX D—SUMMARY OF FINDINGS

Needs for Water Systems in the States[27,28]
(community water systems and not-for-profit noncommunity water systems)

Exhibit D-1—Total Need for Water Systems in the States by Project Type

Exhibit D-2—Current Need for Water Systems in the States by Project Type

Exhibit D-3—Total Need for Water Systems in the States by System Size

Exhibit D-4—Current Regulatory Need for Water Systems in the States

Exhibit D-5—Total Existing Regulatory Need for Water Systems in the States

Needs for American Indian and Alaska Native Village Water Systems

Exhibit D-6—Total Need for American Indian and Alaska Native Village Systems by EPA Region

Exhibit D-7—Total Need by Project Type for American Indian and Alaska Native Village Water Systems

Exhibit D-8—Total Existing Regulatory Need for American Indian and Alaska Native Village Water Systems

Needs Attributable to Future Drinking Water Regulations[29]

Exhibit D-9—Total Proposed and Recently Promulgated Regulatory Need

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Note: Numbers in Exhibit D-1 through D-9 may not total due to rounding.

[27] Exhibits D-1 through D-5 do not include needs for American Indian or Alaska native village water systems. These needs are reported separately in Exhibits D-6 through D-8.

[28] Exhibits D-1, D-3, and D-5 through D-8 include costs associated with the recently promulgated Arsenic Rule but do not include costs associated with other proposed or recently promulgated SDWA regulations.

[29] Exhibit D-9 includes costs associated with proposed or recently promulgated SDWA regulations for waters systems in the states, American Indian communities, and Alaska native villages.

Exhibit D-1: Total Need for Water Systems in the States by Project Type (20-year need in millions of January 2003 dollars)

State	Transmission and Distribution	Treatment[1]	Storage	Source	Other	Total
Alabama	917.6	415.2	302.9	48.3	4.9	**1,688.9**
Alaska	444.2	63.2	126.4	45.1	2.6	**681.5**
Arizona	7,262.9	1,114.2	483.5	216.8	42.5	**9,119.8**
Arkansas	2,296.3	727.5	346.3	156.1	12.5	**3,538.7**
California	18,052.7	4,830.1	3,005.5	1,704.3	278.8	**27,871.5**
Colorado	3,472.8	996.3	452.2	370.8	31.5	**5,323.5**
Connecticut	336.2	176.5	96.3	40.1	4.0	**653.1**
Delaware	143.2	36.9	39.3	20.3	1.1	**240.8**
District of Columbia	132.5	0.0	15.5	0.0	1.3	**149.4**
Florida	10,387.3	2,595.5	983.4	936.6	137.9	**15,040.7**
Georgia	6,911.1	1,073.3	573.5	318.5	141.2	**9,017.6**
Hawaii	630.5	48.7	94.5	34.7	4.2	**812.5**
Idaho	430.7	126.9	111.8	52.1	5.6	**727.0**
Illinois	8,353.3	2,463.0	1,170.3	1,284.7	225.5	**13,496.8**
Indiana	2,503.6	741.4	477.2	284.4	25.2	**4,031.8**
Iowa	2,602.5	373.4	328.4	170.7	28.9	**3,503.9**
Kansas	1,303.9	238.8	256.4	115.0	16.8	**1,930.9**
Kentucky	2,162.0	318.0	254.8	53.4	20.6	**2,808.8**
Louisiana	2,923.6	576.7	317.0	242.2	47.2	**4,106.8**
Maine	547.8	110.8	120.6	47.2	5.4	**831.8**
Maryland	2,562.8	800.2	453.2	115.4	31.7	**3,963.2**
Massachusetts	6,611.0	877.1	622.1	318.2	126.2	**8,554.7**
Michigan	7,937.4	1,985.5	834.6	371.5	182.0	**11,311.1**
Minnesota	3,362.3	1,179.7	566.0	274.6	77.8	**5,460.5**
Mississippi	914.5	291.6	270.3	160.1	7.9	**1,644.5**
Missouri	4,625.5	686.9	463.9	171.7	10.3	**5,958.2**
Montana	469.0	152.7	115.8	48.2	3.6	**789.3**
Nebraska	737.3	371.0	125.8	107.8	12.2	**1,354.0**
Nevada	564.0	152.9	134.6	53.5	7.0	**912.1**
New Hampshire	321.2	109.3	114.7	47.5	2.9	**595.6**
New Jersey	5,081.1	703.5	736.2	322.7	72.1	**6,915.6**
New Mexico	498.9	261.8	112.7	46.2	2.7	**922.2**
New York	10,664.8	2,408.1	1,166.6	449.1	124.0	**14,812.5**
North Carolina	7,502.5	1,889.9	950.3	478.6	158.9	**10,980.2**
North Dakota	282.8	180.7	77.1	60.5	5.7	**606.8**
Ohio	7,084.6	1,330.5	827.0	371.0	71.1	**9,684.1**
Oklahoma	3,714.3	653.6	267.2	162.3	6.8	**4,804.2**
Oregon	2,519.6	659.9	842.7	230.6	14.8	**4,267.6**
Pennsylvania	7,838.9	1,550.9	1,090.1	457.5	52.9	**10,990.3**
Puerto Rico	1,593.3	471.9	154.5	45.6	13.5	**2,278.8**
Rhode Island	290.1	71.8	28.0	9.3	3.4	**402.6**
South Carolina	970.3	108.6	105.6	50.9	10.2	**1,245.6**
South Dakota	704.4	151.4	92.9	37.8	3.3	**989.8**
Tennessee	2,131.3	313.0	242.5	63.6	20.0	**2,770.4**
Texas	19,423.0	5,631.7	1,941.9	1,033.5	139.6	**28,169.6**
Utah	481.2	97.0	92.6	34.4	1.7	**706.9**
Vermont	229.4	77.7	60.3	24.1	3.3	**394.8**
Virginia	1,986.7	403.4	324.0	133.5	17.5	**2,865.0**
Washington	4,382.3	785.3	1,077.3	382.6	44.2	**6,671.7**
West Virginia	478.8	166.7	159.8	48.5	8.1	**861.9**
Wisconsin	3,948.4	1,054.7	575.0	337.7	22.3	**5,938.1**
Wyoming	193.4	45.7	42.7	15.1	1.3	**298.2**
Subtotal	**181,920.0**	**42,650.9**	**24,223.6**	**12,604.8**	**2,296.7**	**263,696.1**
American Samoa	12.1	5.3	11.1	2.7	1.2	**32.3**
Guam	204.8	8.1	27.7	32.2	6.3	**279.0**
North Mariana Is.	69.8	78.1	35.9	9.2	4.8	**197.8**
Virgin Islands	77.1	36.8	53.7	11.6	1.2	**180.4**
Subtotal	**363.8**	**128.3**	**128.3**	**55.7**	**13.5**	**689.5**
Total	**182,283.8**	**42,779.2**	**24,351.9**	**12,660.5**	**2,310.2**	**264,385.6**

[1]Does not include needs associated with proposed or recently promulgated regulations, except for the recently promulgated Arsenic Rule.

Exhibit D-2: Current Need for Water Systems in the States by Project Type (20-year need in millions of January 2003 dollars)

State	Transmission and Distribution	Treatment	Storage	Source	Other	Total
Alabama	304.7	48.3	44.7	13.0	3.1	**413.8**
Alaska	257.3	21.6	48.3	19.8	1.4	**348.4**
Arizona	6,346.6	624.8	272.7	119.8	41.0	**7,404.8**
Arkansas	1,539.0	291.6	149.8	77.5	10.1	**2,068.0**
California	11,819.4	3,252.8	1,860.6	1,134.0	183.7	**18,250.6**
Colorado	1,672.8	513.3	241.3	315.5	29.6	**2,772.4**
Connecticut	242.1	94.7	34.2	20.5	2.6	**394.2**
Delaware	112.1	18.6	16.1	10.8	0.9	**158.3**
District of Columbia	69.5	0.0	8.1	0.0	1.3	**78.9**
Florida	9,495.0	1,809.7	720.0	599.0	117.1	**12,740.8**
Georgia	6,331.4	625.0	381.9	266.4	134.4	**7,739.1**
Hawaii	286.4	33.5	56.1	29.8	2.5	**408.2**
Idaho	318.1	50.2	44.4	30.2	4.9	**447.7**
Illinois	4,653.1	908.1	513.1	236.0	139.0	**6,449.3**
Indiana	1,588.6	343.0	225.7	140.1	22.6	**2,320.0**
Iowa	1,935.5	136.5	158.9	70.4	19.1	**2,320.4**
Kansas	847.1	98.6	151.5	71.3	10.6	**1,179.2**
Kentucky	1,379.1	155.2	154.6	25.1	14.8	**1,728.8**
Louisiana	2,267.1	272.0	182.1	147.7	42.4	**2,911.4**
Maine	381.6	49.1	67.6	25.4	3.9	**527.5**
Maryland	2,217.6	662.8	353.8	71.4	29.8	**3,335.4**
Massachusetts	4,737.4	290.0	365.3	118.7	50.7	**5,562.1**
Michigan	5,447.1	1,097.1	341.9	154.2	125.9	**7,166.2**
Minnesota	1,759.0	619.0	216.4	101.8	45.1	**2,741.3**
Mississippi	730.6	139.1	130.9	96.0	5.5	**1,102.2**
Missouri	2,166.2	171.8	142.8	68.1	6.9	**2,555.8**
Montana	405.8	39.8	50.1	25.7	3.2	**524.6**
Nebraska	441.4	262.1	47.0	49.2	6.9	**806.6**
Nevada	284.3	17.3	54.2	18.8	2.0	**376.6**
New Hampshire	201.1	35.5	41.5	24.1	2.4	**304.5**
New Jersey	2,641.7	442.3	408.5	222.1	42.4	**3,757.0**
New Mexico	375.4	31.5	34.2	20.1	2.2	**463.6**
New York	9,078.0	2,066.4	687.0	248.0	115.2	**12,194.6**
North Carolina	2,987.0	636.2	309.7	186.8	109.1	**4,228.8**
North Dakota	201.2	74.2	37.8	39.7	4.6	**357.4**
Ohio	2,934.5	824.1	337.2	177.6	51.3	**4,324.8**
Oklahoma	1,524.1	128.7	86.0	51.3	5.6	**1,795.7**
Oregon	2,242.3	499.6	660.4	142.0	14.0	**3,558.3**
Pennsylvania	6,297.0	1,186.9	674.5	345.1	41.9	**8,545.3**
Puerto Rico	1,003.3	294.6	97.9	31.5	9.4	**1,436.7**
Rhode Island	234.6	25.0	10.7	4.6	2.2	**277.1**
South Carolina	573.1	39.8	47.8	29.3	7.1	**697.1**
South Dakota	220.7	60.5	38.9	20.7	2.7	**343.4**
Tennessee	1,014.6	111.3	112.3	27.4	10.2	**1,275.9**
Texas	9,974.2	2,981.6	656.8	376.2	51.3	**14,040.1**
Utah	382.1	31.7	64.5	14.9	1.4	**494.7**
Vermont	157.3	34.9	24.9	14.1	2.2	**233.5**
Virginia	997.0	174.2	130.5	59.4	13.4	**1,374.6**
Washington	3,198.7	285.2	579.1	211.3	22.2	**4,296.7**
West Virginia	336.2	86.3	66.5	28.4	5.4	**522.7**
Wisconsin	1,708.3	529.3	215.0	198.7	17.4	**2,668.6**
Wyoming	96.8	15.0	17.3	8.7	1.1	**138.8**
Subtotal	**118,414.9**	**23,240.9**	**12,372.9**	**6,538.0**	**1,595.9**	**162,162.5**
American Samoa	11.4	4.1	10.9	2.6	1.1	**30.0**
Guam	204.6	7.7	27.6	32.1	6.3	**278.5**
North Mariana Is.	56.2	64.8	12.2	7.5	2.9	**143.6**
Virgin Islands	70.7	24.1	33.7	10.5	1.2	**140.1**
Subtotal	**342.9**	**100.7**	**84.4**	**52.7**	**11.4**	**592.2**
Total	**118,757.8**	**23,341.5**	**12,457.3**	**6,590.7**	**1,607.4**	**162,754.7**

Exhibit D-3: Total Need for Water Systems in the States by System Size (20-year need in millions of January 2003 dollars)

State	Large CWSs	Medium CWSs	Small CWSs [1]	NPNCWSs [1]	Recently Promulgated Arsenic Rule [2]	Total
Alabama	615.2	782.4	288.1	3.2	0.0	**1,688.9**
Alaska	163.6	264.4	187.0	51.0	15.4	**681.5**
Arizona	5,556.5	2,988.3	467.1	15.5	92.5	**9,119.8**
Arkansas	778.7	2,187.3	566.6	6.1	0.0	**3,538.7**
California	19,828.6	5,823.3	2,016.7	84.6	118.2	**27,871.5**
Colorado	2,664.7	2,022.8	627.0	1.1	7.9	**5,323.5**
Connecticut	165.0	121.5	328.5	22.9	15.0	**653.1**
Delaware	72.1	7.4	157.9	2.7	0.8	**240.8**
District of Columbia	149.4	0.0	0.0	0.0	0.0	**149.4**
Florida	7,903.1	6,011.5	1,018.2	106.6	1.2	**15,040.7**
Georgia	4,825.6	3,411.1	768.6	11.5	0.8	**9,017.6**
Hawaii	477.7	213.0	115.4	0.8	5.5	**812.5**
Idaho	83.4	169.8	408.9	31.5	33.3	**727.0**
Illinois	6,095.0	5,835.5	1,450.9	92.0	23.4	**13,496.8**
Indiana	1,064.1	2,157.4	662.7	147.3	0.4	**4,031.8**
Iowa	716.3	1,953.9	792.6	15.4	25.7	**3,503.9**
Kansas	475.1	716.1	729.7	2.9	7.1	**1,930.9**
Kentucky	656.9	1,878.8	272.2	0.9	0.0	**2,808.8**
Louisiana	1,143.6	2,175.8	757.5	12.5	17.4	**4,106.8**
Maine	76.3	429.2	287.7	28.8	9.9	**831.8**
Maryland	2,947.0	640.4	292.7	82.0	1.2	**3,963.2**
Massachusetts	2,808.7	5,459.5	248.7	27.5	10.3	**8,554.7**
Michigan	5,994.0	3,840.8	1,012.2	394.4	69.7	**11,311.1**
Minnesota	1,453.9	3,018.2	743.3	224.1	21.0	**5,460.5**
Mississippi	65.2	664.5	906.0	8.0	0.8	**1,644.5**
Missouri	1,027.1	3,889.0	1,005.5	32.7	4.0	**5,958.2**
Montana	121.1	246.2	373.0	42.3	6.7	**789.3**
Nebraska	484.1	472.4	375.5	13.4	8.7	**1,354.0**
Nevada	522.8	171.4	172.8	11.9	33.3	**912.1**
New Hampshire	22.4	121.5	369.9	51.7	30.1	**595.6**
New Jersey	2,887.6	3,486.3	370.9	170.0	0.8	**6,915.6**
New Mexico	369.8	159.8	358.8	12.8	21.0	**922.2**
New York	10,130.4	2,517.6	2,003.0	105.4	56.2	**14,812.5**
North Carolina	4,632.5	4,997.2	1,035.8	308.8	5.9	**10,980.2**
North Dakota	35.6	343.8	209.8	4.5	13.1	**606.8**
Ohio	4,189.1	4,186.2	1,054.0	235.7	19.0	**9,684.1**
Oklahoma	1,060.7	2,857.8	854.0	18.6	13.1	**4,804.2**
Oregon	1,409.0	2,122.5	674.2	46.4	15.4	**4,267.6**
Pennsylvania	5,733.7	3,495.3	1,520.7	235.3	5.1	**10,990.3**
Puerto Rico	1,094.5	707.1	471.0	1.0	5.1	**2,278.8**
Rhode Island	234.9	116.7	36.0	13.5	1.6	**402.6**
South Carolina	451.7	498.6	280.2	13.5	1.6	**1,245.6**
South Dakota	11.1	722.2	243.5	4.3	8.7	**989.8**
Tennessee	530.0	1,820.4	396.0	24.1	0.0	**2,770.4**
Texas	15,212.5	9,896.8	2,964.2	39.8	56.2	**28,169.6**
Utah	154.3	300.5	231.4	10.8	9.9	**706.9**
Vermont	2.2	107.9	274.6	0.1	9.9	**394.8**
Virginia	1,203.5	872.3	709.1	76.6	3.6	**2,865.0**
Washington	2,299.6	2,764.2	1,404.8	96.9	106.1	**6,671.7**
West Virginia	43.6	209.1	568.3	40.2	0.8	**861.9**
Wisconsin	1,895.3	2,834.7	776.6	403.8	27.7	**5,938.1**
Wyoming	16.2	122.3	144.7	10.2	4.8	**298.2**
Subtotal	**122,555.0**	**102,812.6**	**33,985.1**	**3,397.5**	**945.8**	**263,696.1**
American Samoa	0.0	13.2	18.7	0.0	0.4	**32.3**
Guam	221.6	50.2	7.2	0.0	0.0	**279.0**
North Mariana Is.	75.0	96.9	25.1	0.0	0.8	**197.8**
Virgin Islands	0.0	44.6	135.4	0.0	0.4	**180.4**
Subtotal	**296.7**	**204.8**	**186.4**	**0.0**	**1.6**	**689.5**
Total	**122,851.7**	**103,017.4**	**34,171.5**	**3,397.5**	**947.4**	**264,385.6**

[1] 1999 Drinking Water Infrastructure Needs Survey and Assessment findings were used to calculate the need for systems serving 3,300 and fewer people (smalls) and not-for-profit noncommunity water systems (NPNCWSs). 1999 Needs Assessment results were adjusted to January 2003 dollars.

[2] Data did not allow allocation of costs by system size for the recently promulgated Arsenic Rule.

Exhibit D-4: Current Regulatory Need for Water Systems in the States (20-year need in millions of January 2003 dollars)

State	SWTR/ IESWTR	TCR	Nitrate/ Nitrite	Lead and Copper Rule	TTHMs	Other	Total
Alabama	15.9	0.0	0.0	3.8	0.0	4.8	**24.6**
Alaska	16.2	6.8	0.1	0.6	0.0	2.2	**26.0**
Arizona	353.7	0.4	0.2	9.1	1.0	11.9	**376.3**
Arkansas	210.9	0.2	0.1	3.9	0.0	3.0	**218.2**
California	3,023.2	261.2	72.7	14.5	16.4	233.5	**3,621.4**
Colorado	436.5	0.9	0.2	6.7	0.0	0.8	**445.1**
Connecticut	72.5	0.2	0.3	1.0	0.0	0.4	**74.4**
Delaware	7.2	0.0	0.1	0.4	0.0	0.4	**8.2**
District of Columbia	0.0	0.0	0.0	1.4	0.0	0.0	**1.4**
Florida	64.9	4.4	0.5	146.7	40.0	11.1	**267.8**
Georgia	483.0	0.1	0.5	53.3	2.5	1.5	**540.9**
Hawaii	14.5	0.0	0.0	0.7	13.3	0.4	**28.9**
Idaho	36.7	0.3	0.3	1.3	0.0	0.5	**39.1**
Illinois	423.6	55.0	6.1	181.0	0.0	172.3	**838.1**
Indiana	179.6	1.5	0.2	30.6	0.0	2.3	**214.3**
Iowa	31.6	21.3	173.5	8.1	0.0	27.1	**261.6**
Kansas	39.8	0.0	11.7	16.6	0.0	2.0	**70.1**
Kentucky	145.5	22.3	0.0	40.8	2.7	0.9	**212.3**
Louisiana	137.3	1.2	0.2	3.3	2.2	2.6	**146.9**
Maine	32.9	33.3	0.1	2.4	0.4	2.1	**71.3**
Maryland	504.0	1.4	0.1	27.5	0.6	2.7	**536.4**
Massachusetts	253.3	64.5	0.1	88.8	0.0	46.1	**452.9**
Michigan	885.7	547.4	0.4	255.0	9.6	24.1	**1,722.3**
Minnesota	54.6	4.0	1.8	40.4	0.0	39.3	**140.1**
Mississippi	20.5	0.2	0.1	4.3	0.0	3.7	**28.9**
Missouri	97.2	0.8	0.4	13.6	0.0	2.7	**114.6**
Montana	22.8	0.4	0.2	1.4	0.0	0.5	**25.3**
Nebraska	226.8	0.1	51.0	3.7	0.0	16.4	**298.0**
Nevada	7.1	0.1	0.1	0.7	0.0	0.4	**8.5**
New Hampshire	14.8	0.5	0.3	1.5	0.0	0.5	**17.5**
New Jersey	295.1	3.5	0.1	91.2	0.0	27.1	**417.1**
New Mexico	10.2	0.1	0.2	1.3	0.0	0.7	**12.6**
New York	1,987.0	4.6	5.7	81.3	10.2	15.3	**2,104.1**
North Carolina	505.3	105.0	2.4	17.4	0.0	25.9	**655.9**
North Dakota	38.3	3.1	0.1	0.8	0.0	0.8	**43.1**
Ohio	712.2	44.0	39.1	158.0	20.9	5.5	**979.7**
Oklahoma	91.4	0.2	0.2	13.6	0.0	1.9	**107.4**
Oregon	521.2	0.9	0.3	15.5	0.0	2.5	**540.4**
Pennsylvania	848.2	3.4	9.3	65.1	0.3	15.5	**941.8**
Puerto Rico	338.2	0.0	0.1	4.5	0.0	0.5	**343.2**
Rhode Island	16.8	0.1	0.0	32.9	0.0	0.1	**49.9**
South Carolina	25.4	2.8	0.1	3.0	0.0	0.8	**32.1**
South Dakota	27.7	0.0	0.1	0.6	0.0	0.5	**28.9**
Tennessee	76.9	0.2	0.1	3.4	1.5	1.9	**84.0**
Texas	2,421.0	15.7	0.9	26.7	1.4	34.2	**2,500.0**
Utah	15.5	0.1	0.1	0.8	0.0	0.6	**17.1**
Vermont	27.9	0.1	0.1	2.3	0.0	0.3	**30.8**
Virginia	140.3	15.6	0.4	4.5	0.4	20.6	**181.8**
Washington	97.5	42.3	0.9	15.1	0.0	2.3	**158.2**
West Virginia	66.1	0.4	0.1	5.6	0.0	1.8	**74.0**
Wisconsin	116.0	11.0	21.9	124.7	0.0	299.7	**573.3**
Wyoming	9.5	0.1	0.1	1.1	0.0	0.2	**11.0**
Subtotal	**16,200.0**	**1,282.4**	**404.1**	**1,632.6**	**123.5**	**1,075.1**	**20,717.8**
American Samoa	0.4	0.0	0.0	0.0	0.0	0.0	**0.4**
Guam	7.6	0.0	0.0	0.0	0.0	0.0	**7.6**
North Mariana Is.	40.7	0.0	0.0	0.0	0.0	0.0	**40.7**
Virgin Islands	40.2	0.0	0.0	0.7	0.0	0.0	**40.9**
Subtotal	**88.9**	**0.0**	**0.0**	**0.7**	**0.0**	**0.1**	**89.6**
Total	**16,288.9**	**1,282.4**	**404.1**	**1,633.3**	**123.5**	**1,075.2**	**20,807.4**

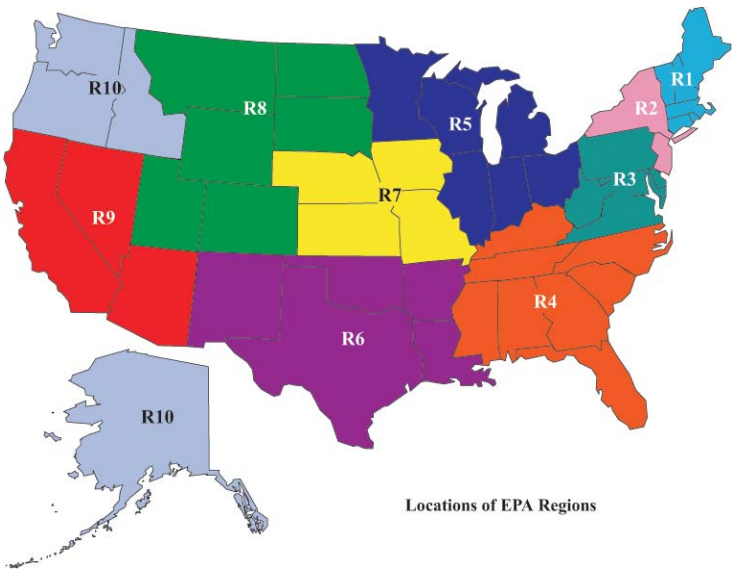
Exhibit D-5: Total Existing Regulatory Need for Water Systems in the States (20-year need in millions of January 2003 dollars)

State	SWTR/ IESWTR	TCR	Nitrate/ Nitrite	Recently Promulgated Arsenic Rule	Lead and Copper Rule	TTHMs	Other	Total
Alabama	313.7	0.1	0.0	0.0	4.0	0.1	4.8	**322.7**
Alaska	19.3	7.2	0.1	15.4	0.6	0.0	51.5	**94.2**
Arizona	678.7	1.8	0.2	92.5	9.1	1.0	12.2	**795.4**
Arkansas	472.6	0.5	0.1	0.0	4.9	0.0	4.2	**482.3**
California	3,911.1	399.0	119.3	118.2	34.3	18.9	258.8	**4,859.5**
Colorado	865.0	1.6	0.2	7.9	6.9	0.0	0.8	**882.5**
Connecticut	87.1	1.0	0.3	15.0	1.0	0.0	0.4	**104.8**
Delaware	7.2	0.3	0.1	0.8	0.4	0.0	1.8	**10.7**
District of Columbia	0.0	0.0	0.0	0.0	21.9	0.0	0.0	**21.9**
Florida	101.2	18.6	0.5	1.2	146.9	40.0	11.1	**319.6**
Georgia	723.2	1.6	0.5	0.8	53.3	2.5	1.5	**783.4**
Hawaii	15.5	0.1	0.0	5.5	0.7	13.3	0.4	**35.5**
Idaho	41.7	1.2	0.3	33.3	1.5	0.0	1.7	**79.6**
Illinois	1,857.2	285.0	7.8	23.4	246.3	0.9	226.8	**2,647.4**
Indiana	221.4	2.0	0.2	0.4	34.4	0.0	2.3	**260.8**
Iowa	68.4	23.8	173.5	25.7	8.4	1.7	33.8	**335.4**
Kansas	60.2	0.7	24.8	7.1	16.6	0.0	18.9	**128.3**
Kentucky	260.6	32.5	0.0	0.0	60.1	3.2	0.9	**357.4**
Louisiana	285.9	1.9	0.2	17.4	3.3	2.2	10.8	**321.7**
Maine	59.8	44.7	0.1	9.9	2.4	0.4	2.1	**119.6**
Maryland	524.7	1.9	0.5	1.2	27.5	0.6	2.7	**559.2**
Massachusetts	721.8	68.0	0.1	10.3	99.0	0.0	46.1	**945.4**
Michigan	1,222.3	992.2	0.4	69.7	327.3	16.1	36.6	**2,664.7**
Minnesota	133.7	4.9	1.8	21.0	65.6	0.0	42.2	**269.2**
Mississippi	34.3	0.6	0.1	0.8	4.3	0.0	3.7	**43.9**
Missouri	338.9	2.1	0.4	4.0	13.8	0.0	2.7	**361.9**
Montana	91.7	1.2	0.2	6.7	1.5	0.0	0.5	**101.7**
Nebraska	240.3	0.7	72.0	8.7	3.9	0.0	19.6	**345.2**
Nevada	93.0	0.4	0.1	33.3	19.5	0.0	0.4	**146.7**
New Hampshire	18.6	1.3	0.3	30.1	1.5	5.3	0.5	**57.6**
New Jersey	346.3	3.9	0.1	0.8	125.9	0.0	31.3	**508.4**
New Mexico	186.8	0.8	0.2	21.0	1.4	0.0	0.7	**210.8**
New York	2,057.8	8.5	13.4	56.2	94.3	13.8	23.7	**2,267.8**
North Carolina	1,517.9	107.4	2.4	5.9	18.8	1.4	37.8	**1,691.8**
North Dakota	107.3	5.8	0.1	13.1	3.8	0.0	0.8	**130.9**
Ohio	966.2	465.1	39.1	19.0	185.8	70.9	5.9	**1,752.1**
Oklahoma	537.4	3.4	0.2	13.1	13.9	0.0	1.9	**569.9**
Oregon	597.8	1.9	0.3	15.4	16.9	0.0	2.5	**634.9**
Pennsylvania	1,037.6	5.4	9.3	5.1	65.2	2.9	15.5	**1,141.1**
Puerto Rico	500.9	0.2	0.1	5.1	4.6	0.0	0.5	**511.3**
Rhode Island	41.7	0.9	0.0	1.6	32.9	0.0	0.1	**77.1**
South Carolina	67.7	6.1	0.1	1.6	4.3	0.0	0.8	**80.6**
South Dakota	53.2	0.4	0.1	8.7	14.1	0.0	0.5	**77.1**
Tennessee	224.8	0.6	0.1	0.0	3.4	1.5	1.9	**232.3**
Texas	4,501.7	18.7	0.9	56.2	26.9	1.4	49.1	**4,654.9**
Utah	48.9	0.4	0.1	9.9	0.8	0.0	0.6	**60.8**
Vermont	42.9	0.5	0.1	9.9	2.5	0.0	0.3	**56.2**
Virginia	283.0	23.7	0.4	3.6	5.3	0.4	32.2	**348.7**
Washington	221.1	57.1	0.9	106.1	16.8	0.0	2.3	**404.5**
West Virginia	108.0	0.8	0.1	0.8	9.1	0.0	3.0	**121.8**
Wisconsin	308.5	22.4	28.7	27.7	133.8	0.0	319.0	**840.1**
Wyoming	23.0	0.3	0.1	4.8	3.0	0.0	0.2	**31.5**
Subtotal	**27,250.0**	**2,631.5**	**501.4**	**945.8**	**2,004.5**	**198.7**	**1,330.6**	**34,862.5**
American Samoa	0.5	0.0	0.0	0.4	0.0	0.0	0.0	**0.9**
Guam	7.6	0.0	0.0	0.0	0.0	0.0	0.0	**7.6**
North Mariana Is.	40.7	0.0	0.0	0.8	0.0	0.0	0.0	**41.5**
Virgin Islands	48.0	0.0	0.0	0.4	0.7	0.0	0.0	**49.1**
Subtotal	**96.8**	**0.0**	**0.0**	**1.6**	**0.7**	**0.0**	**0.1**	**99.1**
Total	**27,346.8**	**2,631.5**	**501.4**	**947.4**	**2,005.2**	**198.7**	**1,330.6**	**34,961.7**

Exhibit D-6: Total Need for American Indian and Alaska Native Village Systems by EPA Region (20-year need in millions of January 2003 dollars)

EPA Region	Total Need[1]
Region 1	4.3
Region 2	6.6
Region 3[2]	0.0
Region 4	19.5
Region 5	172.5
Region 6	166.7
Region 7	15.7
Region 8	146.3
Region 9[3]	602.0
Region 10[4]	129.8
Alaska Native Systems	1,170.5
American Indian and Alaska Native Need to Comply with the Recently Promulgated Arsenic Rule	14.7
Total	**2,448.5**

[1] 1999 Drinking Water Infrastructure Needs Survey and Assessment findings converted to January 2003 dollars. Includes costs associated with the recently promulgated Arsenic Rule.
[2] There are no American Indian water systems in EPA Region 3.
[3] Navajo water systems are located in EPA Regions 6, 8, and 9, but for purposes of this report, all Navajo needs are shown in EPA Region 9.
[4] Needs for Alaska native village water systems are not included in the EPA Region 10 total.



Locations of EPA Regions

Exhibit D-7: Total Need by Project Type for American Indian and Alaska Native Village Water Systems (20-year need in millions of January 2003 dollars)

Project Type	Current Needs	Future Needs	Total Need[1]
Transmission and Distribution	1,287.0	60.3	**1,347.3**
Treatment[2]	404.9	57.3	**462.2**
Storage	437.4	52.9	**490.3**
Source	109.1	26.0	**135.1**
Other	13.6	0.0	**13.6**
Total	**2,252.0**	**196.5**	**2,448.5**

[1] 1999 Drinking Water Infrastructure Needs Survey and Assessment findings converted to January 2003 dollars. Includes costs associated with the recently promulgated Arsenic Rule.
[2] Treatment category includes needs for the recently promulgated Arsenic Rule.

Exhibit D-8: Total Existing Regulatory Need for American Indian and Alaska Native Village Water Systems (20-year need in millions of January 2003 dollars)

Regulation	Current Needs	Future Needs	Total Need
Regulations for Contaminants with Acute Health Effects	175.3	5.1	**180.4**
Regulations for Contaminants with Chronic Health Effects	0.2	14.7	**14.9**
Total	**175.5**	**19.8**	**195.3**

1999 Drinking Water Infrastructure Needs Survey and Assessment findings converted to January 2003 dollars. Includes costs associated with the recently promulgated Arsenic Rule.

Exhibit D-9: Total Proposed and Recently Promulgated Regulatory Need (20-year need in millions of January 2003 dollars)

Regulation	Range of Costs		Estimate Included in the 2003 Needs Assessment
	Low Estimate	High Estimate	
Stage 1 Disinfectants/Disinfection Byproducts Rule			2,582.7
Long-Term 1 Enhanced Surface Water Treatment Rule			193.1
Filter Backwash Recycling Rule			157.8
Ground Water Rule	936.8	1,150.2	1,150.2
Stage 2 Disinfectants/Disinfection Byproducts Rule			491.7
Long-Term 2 Enhanced Surface Water Treatment Rule	1,290.9	1,685.7	1,685.7
Radon Rule	144.8	5,794.2	2,782.8
Radionuclides Rule[1]	167.2	883.3	883.3
Total[2]			**9,927.4**

[1] The high and low estimates represent the two approaches presented in the November 2000 "Economic Analysis of the Radionuclides National Primary Drinking Water Regulations." The total capital costs were determined by averaging the total capital costs for compliance with the maximum contaminant level (MCL) set at 20 micrograms per liter (ug/L) and 40 ug/L for each of the two approaches. The final rule set the MCL at 30 ug/L

[2] In calculating the $9.9 billion need associated with proposed and recently promulgated regulations, EPA used the lead option, unless one was not available in which case EPA used the more conservative estimate. These estimates include only the capital costs (i.e., excludes operation and maintenance costs). Costs for the recently promulgated Arsenic Rule are not included in this table.

APPENDIX E—SUMMARY OF FINDINGS FOR SYSTEMS SERVING 10,000 AND FEWER PEOPLE

Needs for Water Systems in the States [28] (community water systems)

Exhibit E-1—Total Need for Systems Serving 10,000 and Fewer People

Note: Numbers in Exhibit E-1 may not total due to rounding.

[28] Exhibit E-1 does not include costs associated with proposed or recently promulgated SDWA regulations, including the recently promulgated Arsenic Rule.

Exhibit E-1: Total Need for Systems Serving 10,000 and Fewer People (20-year need in millions of January 2003 dollars)

	CWSs Serving 10,000 and Fewer People			CWS Need (All Sizes)	Percent of Need for CWSs Serving 10,000 and Fewer People
State	Current Need	Future Need	Total Need	Total Need	
Alabama	265.2	258.3	**523.5**	1,685.7	**31.1%**
Alaska	302.9	148.5	**451.4**	615.0	**73.4%**
Arizona	1,076.2	281.2	**1,357.5**	9,011.9	**15.1%**
Arkansas	1,044.0	581.1	**1,625.0**	3,532.6	**46.0%**
California	2,213.2	1,743.3	**3,956.5**	27,668.6	**14.3%**
Colorado	773.4	668.1	**1,441.5**	5,314.5	**27.1%**
Connecticut	234.4	122.4	**356.8**	615.1	**58.0%**
Delaware	108.4	49.5	**157.9**	237.3	**66.5%**
District of Columbia	0.0	0.0	**0.0**	149.4	**0.0%**
Florida	2,159.3	415.9	**2,575.2**	14,932.9	**17.2%**
Georgia	1,859.4	358.7	**2,218.1**	9,005.3	**24.6%**
Hawaii	130.2	51.2	**181.4**	806.1	**22.5%**
Idaho	335.7	155.7	**491.4**	662.2	**74.2%**
Illinois	2,128.4	1,180.1	**3,308.5**	13,381.4	**24.7%**
Indiana	1,122.1	477.9	**1,600.0**	3,884.2	**41.2%**
Iowa	871.9	389.6	**1,261.5**	3,462.8	**36.4%**
Kansas	712.4	302.9	**1,015.3**	1,920.9	**52.9%**
Kentucky	658.1	292.5	**950.6**	2,807.9	**33.9%**
Louisiana	1,244.7	470.4	**1,715.1**	4,076.9	**42.1%**
Maine	309.9	156.4	**466.3**	793.1	**58.8%**
Maryland	250.2	123.2	**373.3**	3,880.0	**9.6%**
Massachusetts	1,206.3	482.0	**1,688.3**	8,516.9	**19.8%**
Michigan	1,296.0	976.3	**2,272.3**	10,847.0	**20.9%**
Minnesota	930.2	950.9	**1,881.1**	5,215.4	**36.1%**
Mississippi	967.9	410.2	**1,378.1**	1,635.7	**84.3%**
Missouri	1,455.7	1,573.3	**3,029.0**	5,921.6	**51.2%**
Montana	290.2	150.6	**440.8**	740.3	**59.5%**
Nebraska	360.5	275.3	**635.7**	1,332.0	**47.7%**
Nevada	178.1	140.1	**318.2**	867.0	**36.7%**
New Hampshire	250.8	132.4	**383.2**	513.8	**74.6%**
New Jersey	809.8	485.2	**1,295.0**	6,744.8	**19.2%**
New Mexico	308.9	131.1	**440.0**	888.4	**49.5%**
New York	1,862.8	1,013.4	**2,876.2**	14,650.9	**19.6%**
North Carolina	1,326.7	1,491.6	**2,818.4**	10,665.4	**26.4%**
North Dakota	258.9	94.2	**353.1**	589.3	**59.9%**
Ohio	1,517.2	1,016.8	**2,534.0**	9,429.4	**26.9%**
Oklahoma	1,121.4	917.9	**2,039.3**	4,772.5	**42.7%**
Oregon	1,054.9	301.5	**1,356.5**	4,205.7	**32.3%**
Pennsylvania	2,215.8	592.2	**2,808.1**	10,749.8	**26.1%**
Puerto Rico	613.9	181.4	**795.2**	2,272.7	**35.0%**
Rhode Island	24.3	20.8	**45.1**	387.6	**11.6%**
South Carolina	246.2	165.6	**411.8**	1,230.5	**33.5%**
South Dakota	222.8	244.7	**467.5**	976.9	**47.9%**
Tennessee	804.0	653.0	**1,457.0**	2,746.4	**53.1%**
Texas	3,667.3	2,668.3	**6,335.6**	28,073.5	**22.6%**
Utah	416.7	93.6	**510.3**	686.2	**74.4%**
Vermont	217.5	129.3	**346.8**	384.7	**90.1%**
Virginia	665.0	403.5	**1,068.5**	2,784.9	**38.4%**
Washington	1,841.9	746.9	**2,588.8**	6,468.7	**40.0%**
West Virginia	476.4	219.4	**695.8**	820.9	**84.8%**
Wisconsin	1,035.2	677.8	**1,713.0**	5,506.6	**31.1%**
Wyoming	117.5	81.7	**199.2**	283.2	**70.3%**
Subtotal	**45,560.9**	**25,647.8**	**71,208.6**	**259,352.7**	**27.5%**
American Samoa	16.8	1.9	**18.7**	31.9	**58.7%**
Guam	25.9	0.5	**26.4**	279.0	**9.5%**
North Mariana Is.	97.0	25.0	**122.0**	197.0	**61.9%**
Virgin Islands	115.2	21.0	**136.2**	180.0	**75.7%**
Subtotal	**254.9**	**48.5**	**303.4**	**687.9**	**44.1%**
Total	**45,815.8**	**25,696.2**	**71,512.0**	**260,040.6**	**27.5%**

1999 Drinking Water Infrastructure Needs Survey and Assessment findings were used to calculate the need for systems serving 3,300 and fewer people. 1999 Needs Assessment results were adjusted to January 2003 dollars.

APPENDIX F—GLOSSARY

Acute health effects: health effects resulting from exposure to a contaminant that causes severe symptoms to occur quickly—often within a matter of hours or days. Examples include gastrointestinal illness and “blue baby syndrome.”

Capital improvement plan (CIP): a document produced by a local government, utility, or water system that thoroughly outlines, for a specified period of time, all needed capital projects, the reason for each project, and their costs.

Chronic health effects: health effects resulting from long-term exposure to low concentrations of certain contaminants. Cancer is one such health effect.

Coliform bacteria: a group of bacteria whose presence in a water sample indicates the water may contain disease-causing organisms.

Community water system: a public water system that serves at least 15 connections used by year-round residents or that regularly serves at least 25 residents year-round. Examples include cities, towns, and communities such as retirement homes.

Current infrastructure needs: new facilities or deficiencies in existing facilities identified by the state or system for which water systems would begin construction as soon as possible to avoid a threat to public health.

Engineer’s report: a document produced by a professional engineer that outlines the need and cost for a specific infrastructure project.

Existing regulations: drinking water regulations promulgated under the authority of the Safe Drinking Water Act by EPA; existing regulations can be found in the Code of Federal Regulations (CFR) at 40 CFR 141.

Finished water: water that is considered safe and suitable for delivery to customers.

Future infrastructure needs: infrastructure deficiencies that a system expects to address in the next 20 years because of predictable deterioration of facilities. Future infrastructure needs do not include current infrastructure needs. Examples are storage facility and treatment plant replacement where the facility currently performs adequately but will reach the end of its useful life in the next 20 years. Needs solely to accommodate future growth are not included in the Needs Assessment.

Ground water: any water obtained from a source beneath the surface of the ground, which has not been classified as ground water under the direct influence of surface water.

Growth: needs planned solely to accommodate projected future growth are not included in the 2003 Needs Assessment. Eligible projects, however, can be designed for growth expected during the design life of the project. For example, the 2003 Needs Assessment would allow a treatment plant identified as a current need and expected to treat water for 20 years. Such a plant could be designed for the population anticipated to be served at the end of the 20-year period.

Infrastructure needs: the capital costs associated with ensuring the continued protection of public health through rehabilitating or building facilities needed for continued provision of safe drinking water. Categories of need include source development and rehabilitation, treatment, storage, and transmission and distribution. Operation and maintenance needs are not considered infrastructure needs and are not included in this document.

Large water system: in this document, this phrase refers to a community water system serving more than 50,000 people.

Medium water system: in this document, this phrase refers to a community water system serving from 3,301 to 50,000 people.

Microbiological contamination: the occurrence of protozoan, bacteriological, or viral contaminants in a water supply.

Noncommunity water system: a public water system that is not a community water system and that serves a nonresidential population of at least 25 individuals or 15 service connections daily for at least 60 days of the year. Examples of not-for-profit noncommunity water systems include schools and churches.

Potable water: water that is fit to drink.

Public water system: a system that provides water to the public for human consumption through pipes, other constructed conveyances, if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year.

Regulatory need: a capital expenditure required for compliance with regulations.

Safe Drinking Water Act (SDWA): a law passed by Congress in 1974 and amended in 1986 and 1996 to ensure that public water systems provide safe drinking water to consumers. (42 U.S.C.A. §300f to 300j-26)

Small water system: in this document, this phrase refers to a community water system serving 3,300 people or fewer.

Source rehabilitation and development: a category of need that includes the costs involved in developing or improving sources of water for public water systems.

State: in this document, this term refers to all 50 States of the United States, Puerto Rico, the District of Columbia, American Samoa, Guam, the Northern Mariana Islands, and the Virgin Islands.

Storage: a category of need that addresses finished water storage needs faced by public water systems.

Supervisory Control and Data Acquisition (SCADA): an advanced control system that collects all system information for an operator and allows him/her, through user-friendly interfaces, to view all aspects of the system from one place.

Surface water: all water that is open to the atmosphere and subject to surface run-off, including streams, rivers, and lakes.

Transmission and distribution: a category of need that includes replacement or rehabilitation of transmission or distribution lines that carry drinking water from the source to the treatment plant or from the treatment plant to the consumer.

Treatment: a category of need that includes conditioning water or removing microbiological and chemical contaminants. Filtration of surface water sources, pH adjustment, softening, and disinfection are examples of treatment.

Watering point: a central source from which people without piped water can draw drinking water for transport to their homes.