Drinking Water Infrastructure Needs Survey and Assessment
Third Report to Congress

EPA 816-R-05-001, June 2005 Office of Water (4606M)

FINDINGS

The 2003 Drinking Water Needs Survey and Assessment estimated the capital investment needs of the nation's approximately 53,000 community water systems and 21,400 not-for-profit noncommunity water systems. Appendix D provides greater detail of the need by state.

Total 20-Year National Need

The 2003 Needs Assessment indicates that community water systems and not-for-profit noncommunity water systems need $276.8 billion over the next 20 years to install, upgrade, and replace infrastructure. For the 2003 Needs Assessment, states were required to present documentation that described the purpose and scope of each project. In general, infrastructure projects were acceptable if they were needed to protect public health or to maintain the delivery of potable water to homes. Such projects varied greatly in scale, complexity, and cost—from rehabilitating a small storage tank to constructing a high-capacity water treatment plant for a large metropolitan area. EPA excluded projects solely for future growth, fire flow, and general operation and maintenance needs.[13] However, EPA included projects to rehabilitate or replace significant components of deteriorated infrastructure because they were not considered operation and maintenance.

The estimate of total national need represents all community water systems and not-for-profit noncommunity water systems in the states, Puerto Rico, the Virgin Islands and the Pacific island territories, District of Columbia, American Indian communities, and Alaska native villages.

Exhibit 1 shows the total national need by system size and type, and by current and future need. The nation's 1,041 largest community water systems (serving more than 50,000 people) account for $122.9 billion, or 44 percent of the total need. Medium and small community water systems have needs of $103.0 billion and $34.2 billion, respectively. These figures include the needs for small, medium, and large systems in the Pacific island territories and Virgin Islands, which are $509.1 million and $172.6 million, respectively. Not-for-profit noncommunity water systems have $3.4 billion in estimated needs. The American Indian and Alaska native village system needs total $2.5 billion: American Indian water systems need $1.3 billion in infrastructure improvements, and Alaska native villages need $1.2 billion.

Because public water systems are not expected to have accurate estimates of their capital needs for proposed or recently promulgated regulations, EPA used capital costs from Economic Analysis documents for the rules to estimate those needs. Proposed or recently promulgated regulations account for $9.9 billion of the total national need. In addition, the need for compliance with the recently promulgated Arsenic Rule is $1.0 billion. This includes the cost of compliance for water systems in the states ($947.4 million) as well as water systems serving American Indian communities and Alaska native villages ($14.7 million).

Most of the infrastructure needs in the assessment represent projects that systems would address as preventive measures to ensure the continued provision of safe drinking water rather than as corrective actions to address an existing violation of a drinking water standard. EPA recognized that the majority of the total national need stems from the inherent costs of producing and delivering water—which involves an ongoing need to install, upgrade, and replace the basic water system infrastructure.

[13] Projects solely for operation and maintenance, dams, reservoirs, future growth, and fire flow are generally ineligible for DWSRF assistance.

Exhibit 1: Overview of Needs by System Size and Type (in billions of January 2003 dollars)

System Size and Type	Current Need	Future Need	Total Need	Number of Systems[1]
Large Community Water Systems (serving over 50,000 people)[2]	$80.7	$42.1	**$122.9**	**1,041**
Medium Community Water Systems (serving 3,301 to 50,000 people)[2]	$56.4	$46.6	**$103.0**	**7,638**
Small Community Water Systems (serving 3,300 and fewer people)[2,3]	$24.4	$9.8	**$34.2**	**43,039**
Costs Associated with the recently promulgated Arsenic Rule[4]		$0.9	**$0.9**	
Not-for-profit Noncommunity Water Systems[5]	$1.2	$2.2	**$3.4**	**21,400**
American Indian and Alaska Native Village Water Systems[5,6]	$2.3	$0.2	**$2.4**	**974**
Subtotal National Need	**$165.0**	**$101.8**	**$266.8**	
Costs Associated with Proposed and Recently Promulgated Regulations (Taken from EPA Economic Analyses)		$9.9	**$9.9**	
Total National Need	**$165.0**	**$111.8**	**$276.8**	

Note: Numbers may not total due to rounding.

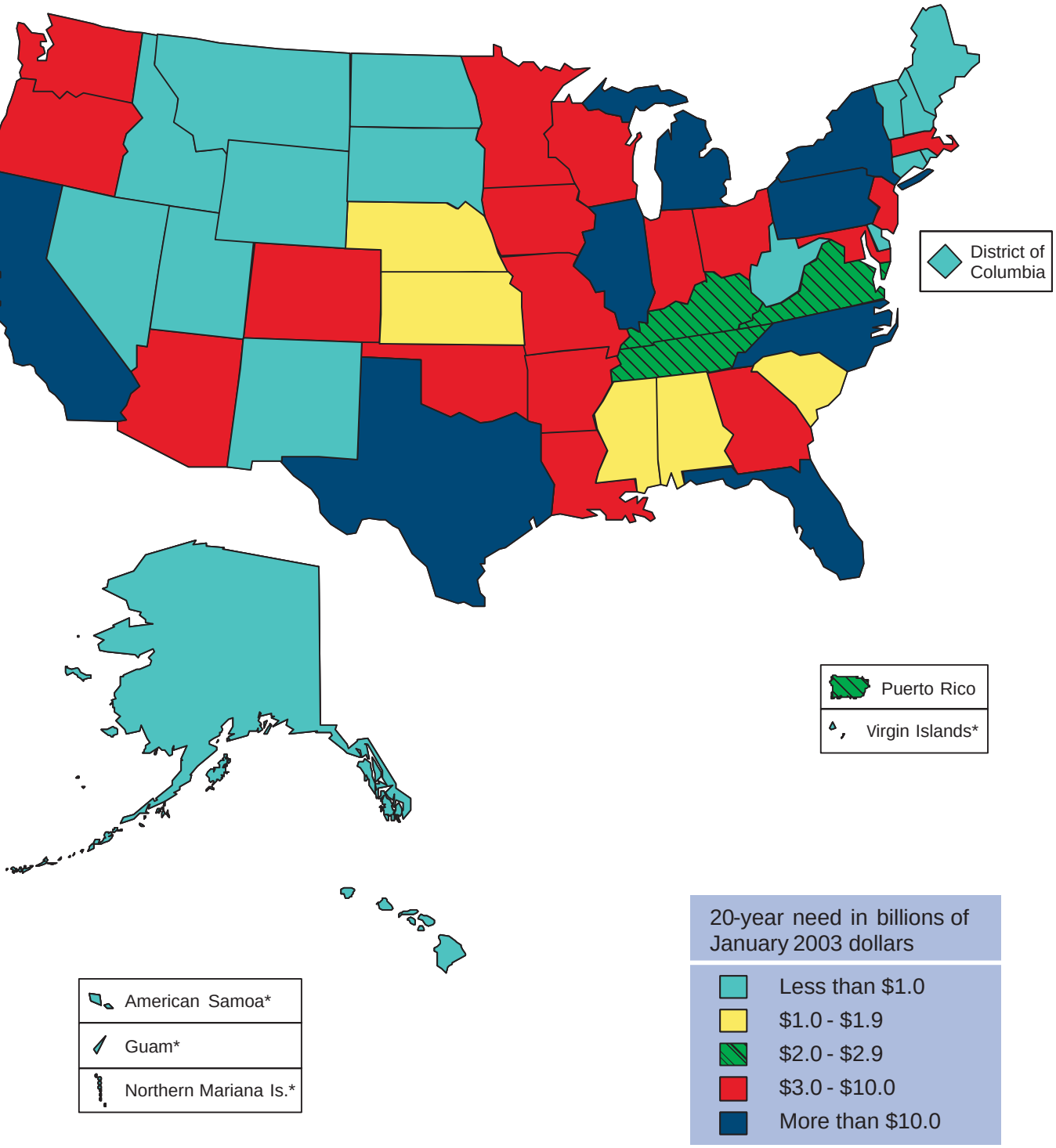
[1] Number of large, medium, and small systems is determined from the 2003 Needs Assessment sample frame. Number of not-for-profit, American Indian, and Alaska native village systems is determined from the 1999 Needs Assessment sample frame. The numbers in the 2003 Needs Assessment may differ from the Safe Drinking Water Information System (SDWIS) due to changes in system inventories and the way the 2003 Needs Assessment classifies some systems (i.e., systems that serve Alaska native villages are classified in SDWIS as small systems, but are classified in the 2003 Needs Assessment as Alaska native village water systems).
[2] Does not include the costs associated with the recently promulgated Arsenic Rule and proposed or recently promulgated SDWA regulations; these costs are included on a separate line in this table.
[3] 1999 Needs Assessment findings adjusted to January 2003 dollars and reallocated based on 2003 inventory of small systems.
[4] Does not include costs for American Indian and Alaska native village water systems to comply with the recently promulgated Arsenic Rule; these costs are incorporated in the estimate for American Indian and Alaska native village water systems.
[5] 1999 Needs Assessment findings adjusted to January 2003 dollars.
[6] Includes cost for compliance with the recently promulgated Arsenic Rule.

Exhibit 2 provides an overview of the needs by state. Appendix D provides a more complete breakdown of needs for each state.

Current and Future Needs

Of the total national need, $165.0 billion are for current needs. Although most systems have current needs, this does not preclude their delivery of safe drinking water to their customers. Rather, many current needs are preventive projects to avoid water quality problems. For example, a system may conclude that some of its 50-year-old pipe is deteriorated. Although the system is in compliance with all regulations, the condition of the pipe makes compliance with the Total Coliform Rule difficult, and occasional breaks may cause interruptions in service.

Exhibit 2: Overview of Needs by State



Includes need for the recently promulgated Arsenic Regulation. Does not include needs for American Indian and Alaska native village water systems.

*The needs for American Samoa, Guam, the Northern Mariana Islands, and the Virgin Islands are less than $1 billion each.

The size of current need reflects the age and deteriorated condition of the nation's infrastructure. Many water systems were constructed 50 to 100 years ago. Some systems have adopted a reactive approach to capital investment that involves replacing or upgrading infrastructure only as it fails. For example, a system may fix leaks in the distribution system, rather than invest in rehabilitation or replacement. A more pro-active approach of planned rehabilitation or replacement should prove less costly over the long run and reduce the likelihood of emerging risks to public health.

Future needs account for $111.8 billion of the total need. Future needs are projects that are not currently necessary. Nevertheless, systems will need to undertake these projects during the 20-year period of the assessment to ensure the continued provision of safe drinking water. Future needs address components of a water system that operate adequately now, but will exceed their design life or performance capabilities within the next 20 years. For example, a recently constructed storage tank operates adequately now, but based on historic trends, the system knows that the tank will require some major rehabilitation within the next 20 years.

Total Need by Project Type

Infrastructure needs of water systems can be grouped into four major categories based on project type–source, transmission and distribution, treatment, or storage—each of which fulfills an important function in delivering safe drinking water to the public. Most needs were assigned to one of these categories. An additional "other" category is comprised of projects that do not fit into one of the four categories. Examples are system-wide security or computer controls. Exhibit 3 shows the total national need by water system size and type and by project type.

Transmission and Distribution Needs. Transmission and distribution projects represent the largest category of need (two-thirds of the total need), $183.6 billion over the next 20 years. Of this total, $120.0 billion is identified as current needs. Although the least visible component of a public water system, the buried pipes of a transmission and distribution network generally account for most of a system's capital value. It is not uncommon for even medium-sized systems to have several hundred miles of pipe. Little of this $183.6 billion is related to any federal mandate. Projects are typically driven by the utilities' need to install and maintain distribution systems to provide potable water to their customers while preventing contamination of that water prior to delivery.

> Industry benchmarks indicate that although most systems address less than 1 percent of their existing pipe per year, an aggressive program would provide for replacement or rehabilitation of as much as 1 to 2 percent of a system's total pipe per year.

Transmission and distribution projects include replacing aging and deteriorated water mains, refurbishing pipes to remove build-up on pipe walls, looping dead-end mains to avoid stagnant water, installing water mains in areas where homes do not have a safe and adequate supply, and installing pumping stations to maintain adequate pressure. This category also includes projects to address the replacement of appurtenances, such as valves that are essential for controlling flows and isolating problem areas during

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Pipebursting is an effective way to upgrade deteriorated pipe. A pneumatic bursting head is attached to new pipe and threaded through the old pipe. As it passes through the old pipe, the bursting head destroys the old pipe, compacting it into the surrounding soil—making room for the new pipe of the same or even larger diameter. Pipebursting is a preferred method of pipe upgrade since it is semi-trenchless and minimizes disruption to streets, homes, and businesses in the area.

repairs, hydrants to flush the distribution system to maintain water quality, and meters to record flow.

Replacing or refurbishing transmission and distribution mains is critical to providing safe drinking water. Failures in transmission and distribution lines can interrupt the delivery of water and possibly allow backsiphonage of contaminated water. Deteriorated distribution mains can pose acute health risks by providing an environment in which bacteria will grow.

The rate at which pipe requires replacement or rehabilitation varies greatly by the age of the pipe, soil characteristics, weather conditions, construction methods, and pipe material. Systems that have neglected to rehabilitate or replace mains may have more aged infrastructure, and therefore a higher level of need.

In addition, some pipe materials have not stood the test of time. Galvanized pipe is particularly susceptible to corrosion in certain soils. Unlined cast

Exhibit 3: Total Need by Project Type (in millions of January 2003 dollars)

System Size and Type	Distribution and Transmission	Treatment	Storage	Source	Other	Total Need
Large Community Water Systems (serving over 50,000 people)[1]	$89,779.9	$20,091.3	$6,994.5	$4,715.8	$1,270.2	**$122,851.7**
Medium Community Water Systems (serving 3,301 to 50,000 people)[1]	$73,454.4	$14,906.2	$9,473.3	$4,392.8	$790.9	**$103,017.4**
Small Community Water Systems (serving 3,300 and fewer people)[1, 2]	$18,624.3	$6,164.1	$6,263.8	$2,871.0	$248.3	**$34,171.5**
Costs Associated with the Recently Promulgated Arsenic Rule[3]		$947.4				**$947.4**
Not-for-profit Noncommunity Water Systems[4]	$425.3	$670.2	$1,620.3	$681.0	$0.8	**$3,397.5**
American Indian and Alaska Native Village Water Systems[4, 5]	$1,347.3	$462.2	$490.3	$135.1	$13.6	**$2,448.5**
Subtotal National Need	**$183,631.1**	**$43,241.4**	**$24,842.2**	**$12,795.6**	**$2,323.7**	**$266,834.1**
Costs Associated with Proposed and Recently Promulgated Regulations (Taken from EPA Economic Analyses)		$9,927.4				**$9,927.4**
Total National Need	**$183,631.1**	**$53,168.8**	**$24,842.2**	**$12,795.6**	**$2,323.7**	**$276,761.5**

Note: Numbers may not total due to rounding.

[1] Does not include the costs associated with the recently promulgated Arsenic Rule and proposed or recently promulgated SDWA regulation; these costs are included on a separate line in this table.
[2] 1999 Needs Assessment findings adjusted to January 2003 dollars and reallocated based on 2003 inventory of small systems.
[3] Does not include costs for American Indian and Alaska native village water systems to comply with the recently promulgated Arsenic Rule; these costs are incorporated in the estimate for American Indian and Alaska native village water systems.
[4] 1999 Needs Assessment findings adjusted to January 2003 dollars.
[5] Includes cost for compliance with the recently promulgated Arsenic Rule.

iron pipe and ductile iron pipe are susceptible to internal corrosion. Furthermore, health concerns associated with asbestos make asbestos cement pipe undesirable. Many water suppliers are systematically removing these types of mains and replacing them with ductile iron or polyvinyl chloride (PVC).

Treatment Needs. The total 20-year need for treatment is $53.2 billion, of which $23.7 billion are current needs. This category includes the installation or rehabilitation of infrastructure to reduce contamination through, for example, filtration, disinfection, corrosion control, and aeration. Since the majority of the capital costs for proposed and recently promulgated regulations are related to treatment, these costs also are included in this category. Treatment facilities vary significantly in scale depending on the quality of source water and type of contamination. Treatment systems range from a simple chlorinator for disinfection to a complete conventional treatment system with coagulation, flocculation, sedimentation, filtration, disinfection, laboratory facilities, waste handling, and computer automated monitoring and control devices.

The workgroup developed 47 different treatment codes for the 2003 Needs Assessment to identify the specific type of treatment being employed by a system. This ensured that the cost of the project was modeled appropriately if costs were not provided.

Treatment technologies primarily address two general types of contaminants: those with acute health effects and those with chronic health effects.

An acute health effect usually occurs within hours or days of short-term exposure to a contaminant. Acute illnesses are associated mostly with microbial contaminants, although some chemical contaminants, such as copper and nitrate, also can cause acute health effects. Gastrointestinal illness resulting from the ingestion of microbial pathogens is the most common acute health effect.

Chronic health effects develop typically after long-term exposure to low concentrations of chemical contaminants. Examples of these effects include cancer and birth defects. The largest need associated with contaminants that pose chronic health effects is treatment for lead. Research has shown that exposure to lead may impair the mental development of children and cause other chronic health effects such as high blood pressure.

The treatment category also includes projects to remove contaminants that adversely affect the taste, odor, and color of drinking water. Treatment for these "secondary contaminants" often involves softening the water to reduce magnesium and calcium levels or applying chemical sequestrants for iron and/or manganese contamination. Although not a public health concern, the aesthetic problems caused by secondary contaminants may prompt some consumers to seek more palatable, but less safe or more expensive, sources of water.

Storage Needs. The total 20-year need for storage projects is $24.8 billion, $12.9 billion of which are current needs. This category includes projects to construct or rehabilitate finished water storage tanks.

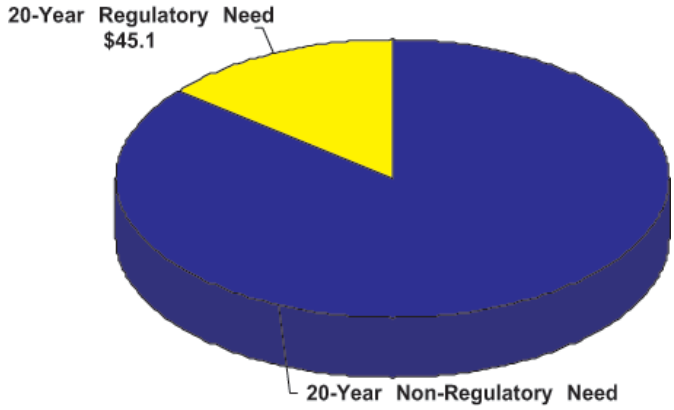
A water system with sufficient storage can provide an adequate supply of treated water to the public even during periods of peak demand. The system can sustain the minimum pressure required to prevent the intrusion of contaminants into the distribution network. Moreover, many states require that systems have the storage capacity to provide a 1- to 2-day supply of water in the event of an emergency, such as a water source being temporarily unusable.

Source Needs. The total 20-year need for source water infrastructure is $12.8 billion. Of this total, $6.7 billion are current needs. The source category includes needs for constructing or rehabilitating

surface water intake structures, raw water pumping facilities, drilled wells, and spring collectors.

Drinking water is obtained from either ground water or surface water sources. Wells are typically considered ground water sources; rivers, lakes, other open bodies of water, and wells under direct influence of surface water are considered surface water sources. Whether drinking water originates from ground or surface water sources, its raw water quality is an important component in protecting public health. A high quality water supply can minimize the possibility of microbial or chemical contamination and may not require expensive treatment facilities. Many source water needs involve construction of new surface water intake structures or drilling new well fields to obtain improved raw water quality.

Exhibit 4: 20-Year Total Regulatory and Non-Regulatory Need (in billions of January 2003 dollars)



Note: Numbers may not total due to rounding.

A water source should also provide enough water under all operating conditions to enable the water system to maintain minimum pressures, even at peak flows. Low water pressure may result in the intrusion of contaminants into the distribution system through backsiphonage. The 2003 Needs Assessment includes projects to expand the capacity of intake structures and add new wells to address supply deficiencies.

Other Needs. Needs not included in the previous categories are labeled "other" needs. These needs account for $2.3 billion of the total 20-year need. Examples of "other" projects include system-wide telemetry or Supervisory Control and Data Acquisition (SCADA), and system-wide security measures.

The Regulatory Need

As shown in Exhibit 4, 16 percent of the total national need, or $45.1 billion, is for compliance with current, new, and proposed SDWA regulations. Although all of the projects in the 2003 Needs Assessment are needed to attain or maintain compliance with the SDWA regulations and goals, most are driven by the need to provide an essential service—potable water—to the utility's customers. However, some of the projects are directly attributable to specific regulations under SDWA. These projects are collectively referred to as the "regulatory need." Most of the regulatory need involves the upgrade, replacement, or installation of treatment technologies.

The total regulatory need is divided into two broad categories: existing SDWA regulations ($35.2 billion), and recently promulgated or proposed regulations ($9.9 billion). Exhibit 5 displays the regulatory need by type of existing regulation. For reporting purposes, the recently promulgated Arsenic Rule is included in the existing regulations section because the total need has been distributed amongst the states.

Proposed or Recently Promulgated Regulatory Needs. The total need to comply with proposed or recently promulgated regulations is $9.9 billion. Of the total, $3.2 billion is to address microbial contaminants that have acute health effects. The total costs of these regulations are included in the 2003 Needs Assessment as future regulatory needs.

The regulations included in this category are the Stage 1 and Stage 2 Disinfectants/Disinfection Byproducts Rules (Stage 1 and Stage 2 DBPR), the Radon Rule, the Ground Water Rule, the Filter Backwash Recycling Rule (FBRR), the Long Term 1

Exhibit 5: 20-Year Regulatory Need (in billions of January 2003 dollars)

Regulations	Total Need
Existing SDWA Regulations	
Interim Enhanced Surface Water Treatment Rule and Surface Water Treatment Rule[1]	**$27.5**
Total Coliform Rule[1]	**$2.6**
Nitrate/Nitrite Standard[1]	**$0.5**
Costs Associated with the Recently Promulgated Arsenic Rule	**$1.0**
Lead and Copper Rule	**$2.0**
Total Trihalomethanes Standard	**$0.2**
Other Regulations[2]	**$1.3**
Subtotal National Need	**$35.2**
Costs Associated with Proposed and Recently Promulgated Regulations (Taken from EPA Economic Analyses)[3]	**$9.9**
Total National Need	**$45.1**

Note: Numbers may not total due to rounding.

[1] Regulations for contaminants that cause acute health effects.
[2] Includes regulated Volatile Organic Chemicals (VOCs), Synthetic Organic Chemicals (SOCs), Inorganic Chemicals (IOCs), and Radionuclides.
[3] Includes regulations for contaminants that cause acute and/or chronic health effects. In the Economic Analyses, the compliance costs with some regulations are given as a range. In calculating the $9.9 billion need, the 2003 Needs Assessment used EPA's lead option, unless one was not available, in which case the 2003 Needs Assessment used the highest 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 category.

and Long Term 2 Enhanced Surface Water Treatment Rules (LT1ESWTR and LT2ESWTR), and the Radionuclides Rule. Capital cost estimates for each of these rules are provided in Exhibit D-9. EPA derived the estimates from the Economic Analysis (EA) that the Agency published when proposing each regulation, or from the final EA (if the regulation has been promulgated).

In general, water systems can readily identify the infrastructure needs required for compliance with existing regulations, but most systems have not yet determined the infrastructure needed to comply with future or recently promulgated regulations. Therefore, relying on systems to report the costs of future or recently promulgated regulations would significantly understate the true need. Because of this, EPA relied on EAs to estimate these compliance costs.

However, since the EAs rely on regional data, they are not good predictors of state-specific needs. Therefore, the costs associated with the proposed or recently promulgated regulations other than the new arsenic standard are allocated at a national level, not apportioned to each state.[14]

Existing Regulations

Microbial Contaminants. The Surface Water Treatment Rule (SWTR), the Interim Enhanced Surface Water Treatment Rule (IESWTR) and the Total Coliform Rule (TCR) are SDWA regulations that address microbial contamination. Projects directly attributable to these regulations account for $30.2 billion, or 86 percent of the total existing regulatory need. (Note: Numbers may not total due to rounding.)

The SWTR and the IESWTR account for almost all of the microbial contaminant-related need and most of the total regulatory need. This reflects the fact that the majority of the nation's large municipal systems use surface water sources. Under these regulations, all systems using surface water sources must provide treatment to minimize microbial contamination. In most cases, this means installing filtration plants to remove and inactivate microbial pathogens, such as the bacterium *E. coli*, the virus Hepatitis A, and the protozoan *Giardia lamblia*. Projects associated with

[14] See the section in Appendix B, "Estimating Costs for Proposed and Recently Promulgated Regulations," for a more detailed discussion.

Many water sources in the nation have arsenic levels above the future regulatory limit of 0.010 milligrams per liter (mg/L). To meet the more stringent arsenic regulation, the pilot plant shown is examining adsorptive and specialty media for optimal arsenic removal.

these regulations also include rehabilitating and upgrading existing treatment facilities. Disinfection for compliance with the IESWTR and the SWTR would also protect the system from TCR violations.

Chemical Contaminants. Existing SDWA regulations to minimize chemical contamination accounts for $5.0 billion of the total regulatory need. This estimate includes projects attributable to the Nitrate/Nitrite Standard, the recently promulgated Arsenic Rule, the Lead and Copper Rule, the Total Trihalomethanes Standard, and other regulations that set MCLs or treatment techniques for organic and inorganic chemicals. Examples of projects include aerating water to remove volatile organic compounds, such as tetrachloroethylene, and applying corrosion inhibitors to reduce the leaching of lead from pipes in home plumbing. This category includes regulation of more than 80 inorganic or organic chemicals for which infrastructure projects may be needed.

Most chemical contaminants are associated with chronic health effects such as cancer, reproductive difficulties, and liver or kidney problems. However, nitrate levels above the health-based standard can cause an acute illness, known as "blue baby syndrome," a condition in which infants are deprived of oxygen in the bloodstream. Also, excessive copper levels can induce acute gastrointestinal illness.

Security Needs

Since the September 11th tragedy, there has been a concentrated national focus on our vulnerabilities, and water systems are no exception. The Public Health Security and Bioterrorism Preparedness and Response Act of 2002 requires any community water system that serves more than 3,300 people to prepare a Vulnerability Assessment. Systems serving at least 50,000 people should have completed the vulnerability assessments during the data collection period of the 2003 Needs Assessment.

Current and Future Regulatory Needs

Of the $45.1 billion total regulatory need, $21.0 billion is the current need for attaining and maintaining compliance with existing regulations. Most water systems with current regulatory needs are currently not in violation of any health-based standards. Rather, these systems identified needs that would enable them to continue to maintain compliance with existing regulations. Water systems also identified projects for future regulatory needs, such as projects that are largely due to the routine rehabilitation or replacement of infrastructure. For example, most conventional filtration plants require the refurbishment of pumps, filters, chemical feed units, and other components within a 20-year period. All of the costs associated with the proposed or recently promulgated regulations are included as future regulatory needs.

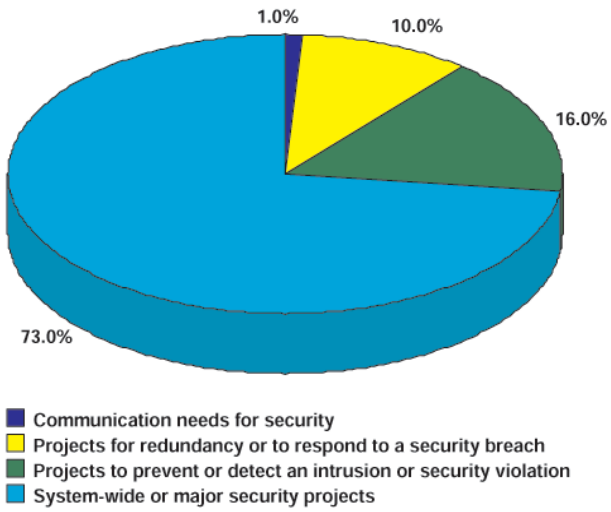
Although water systems have begun to identify their security needs, responses indicate that in 2003 many did not yet have a complete grasp of these needs or their costs. States reported that systems had difficulty in determining security needs because many were in the process of developing their vulnerability assessments, but had not yet completed their comprehensive review.

Despite these limitations, the 2003 Needs Assessment represents some information on security needs from medium and large water systems, and EPA did receive a substantial response from larger metropolitan utilities regarding their security needs. Of the total national need, $1.0 billion was identified as having security as at least one reason for the need. The 2003 Needs Assessment put security projects into five categories. Exhibit 6 provides the breakdown of the total security need into these categories:

- System-wide or major security projects
  - For security reasons, systems could not reveal detail
- Projects to prevent or detect an intrusion or security violation
  - Fencing, lighting, cameras
- Projects for redundancy or to respond to a security breach
  - Generators, parallel pipelines, redundant tanks
- Communication needs for security
  - System Control and Data Acquisition (SCADA) or telemetry
- Projects to address public health and safety issues
  - Changing from gas to liquid chlorine

In addition, many other projects included a component of security as part of a large project. An example is inclusion of a security fence in the description of a project for construction of a new treated water storage tank. The costs for the fence are included in the total national need as a part of the specific project's need; they were not allocated separately to security. The costs of all security components are therefore not included in the totals shown in Exhibit 6.

Exhibit 6: Security Needs by Project Type (Percentage of $1 billion Security Need)



The percentage of security needs attributed to projects to address safety issues was less than 0.5 percent and therefore not represented in this chart.

Understandably, many systems were reluctant to provide much specificity regarding their security plans. EPA therefore required no explicit description of the projects. Most major metropolitan areas, however, did report some security-related needs.

Vulnerability assessments and identification of security needs are rapidly evolving. In the future, it is likely that the industry will adopt security measures that address these vulnerabilities, including the development of new technology for improved surveillance as well as for detection of security breaches. In the longer term, security measures will become more fully incorporated into the capital costs for major infrastructure improvements.

With increased security awareness, the total national security need could rise significantly in the future. Fencing, security cameras and closed circuit television, and well housing are all common first generation security needs. In the future, these items will likely be included in the cost of building new facilities.

Community Water Systems Serving 10,000 and Fewer People

The 2003 Needs Assessment estimates for systems serving fewer than 10,000 people represent $72 billion or 28 percent of the total national need for community water systems regulated by the states. In approximately one-third of the states, these systems' needs comprise over 50 percent of the state's total need. Exhibit E-1 presents the 20-year needs for systems serving 10,000 people and fewer by state.

The SDWA requires that states use at least 15 percent of their DWSRF funding for financial assistance to water systems serving populations of 10,000 or less. Through FY2003, states had allocated 40 percent of their assistance to those systems.

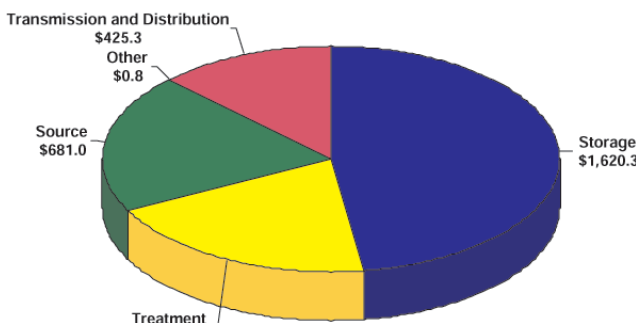
Systems serving 10,000 people and fewer face considerable economic challenges in delivering safe drinking water to their consumers. The substantial capital investments required to rehabilitate, upgrade, or install infrastructure represent one such challenge.

Small systems lack the economies of scale that allow larger systems to spread the costs of capital improvements among their many consumers. For example, the installation of a new 1.0 million gallons per day (MGD) conventional treatment plant designed to serve a community of 5,000 people may cost approximately $2.5 million or $500 per person, whereas a 20 MGD plant serving 150,000 people may cost $30 million but will cost $200 per person. The cost per household is substantially higher for the smaller community. Moreover, larger systems are usually able to purchase material in quantities that result in significant savings.

Not-for-Profit Noncommunity Water Systems

EPA adjusted the 1999 Needs Assessment results to January 2003 dollars to determine the estimate of need for not-for-profit noncommunity water systems. These systems need to invest $3.4 billion in infrastructure improvements over the next 20 years. Of this total, $1.2 billion is identified as current needs to ensure the continued protection of public health. Exhibit 7 presents the not-for-profit noncommunity need by project type. In comparison to community

Exhibit 7: Total 20-Year Need for Not-for-Profit Noncommunity Water Systems by Project Type (in millions of January 2003 dollars)



water systems, noncommunity water systems typically have limited distribution networks; therefore, a higher percentage of their needs are storage needs.

The needs of not-for-profit noncommunity systems comprise a small proportion of the total national need. This reflects the limited infrastructure required for a noncommunity system. In spite of their modest contribution to the total national need, noncommunity water systems are important. Approximately half of the nontransient[15] noncommunity systems are schools and daycare centers serving water to sensitive populations. For this reason, the Agency believes that investing in the infrastructure of these systems is an important contribution to public health.

American Indian and Alaska Native Village Water System Need

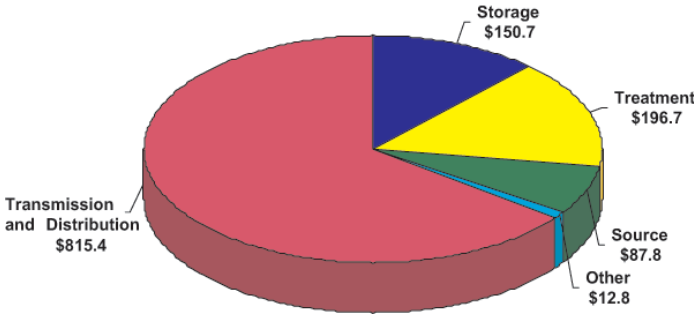
Because of the effort made in the 1999 Needs Assessment, and the high confidence level in the data from that effort, EPA did not resurvey the American Indian and Alaska native village water systems for the 2003 Needs Assessment. Instead, the need established in 1999 was adjusted to 2003 dollars and used as an estimate for the 2003 need.

According to the 2003 Needs Assessment, the American Indian and Alaska native village water systems need to invest an estimated $2.4 billion in capital improvements over the next 20 years. Of this total, $2.3 billion is identified as current needs to ensure the continued provision of safe drinking water. Exhibit 8 presents the total need by project type for American Indian and Alaska native village systems.

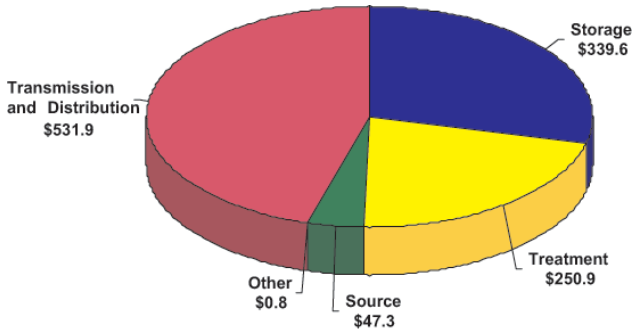
The 2003 Needs Assessment indicates that of the estimated $2.4 billion total needs, American Indian water systems need to invest $1.3 billion and Alaska native village water systems need to invest $1.2 billion in capital improvements. (Note: Numbers do not total due to rounding.) EPA estimates that American Indian and Alaska Native water systems will need to invest $14.7 million to comply with the recently promulgated Arsenic Rule.

Exhibit 8: Total American Indian and Alaska Native Village Water System Need by Project Type (in millions of January 2003 dollars)

American Indian Water System Need



Alaska Native Village Water System Need



Note: Numbers may not total due to rounding.

[15] There are two types of noncommunity water systems: those that serve transient populations (e.g., restaurants, roadside rest areas) and those that serve the same populations more than 6 months of the year (e.g., schools, factories, and office buildings). The second type are called "nontransient" noncommunity systems.

For American Indian systems, the widely dispersed and remote location of many communities and the limited availability of water resources are among the logistical challenges that account for high per-household needs. Alaska native village water systems face higher costs because of their remote arctic locations and the unique design and construction standards required in permafrost conditions.

American Indian Water System Needs

The total 20-year need for American Indian systems is $1.3 billion. Of this total, approximately $1.1 billion is identified as current needs to provide safe drinking water. Exhibit 9 presents the total need by project type for American Indian systems. Exhibit D-6 presents the American Indian need by EPA Region.

Exhibit 9: Total 20-Year Need by Project Type for American Indian Water Systems (in millions of January 2003 dollars)

Categories of Need	Current Need	Future Need	Total Need
Distribution and Transmission	$758.5	$56.8	**$815.4**
Treatment	$172.4	$24.3	**$196.7**
Storage	$116.6	$34.1	**$150.7**
Source	$71.1	$16.7	**$87.8**
Other	$12.8	$0.0	**$12.8**
Total Need	**$1,131.4**	**$131.9**	**$1,263.3**

Note: Numbers may not total due to rounding.

American Indian water system needs were adjusted from 1999 Needs Assessment findings to January 2003 dollars.

Does not include the costs associated with the recently promulgated Arsenic Rule and proposed or recently promulgated SDWA regulations.

Alaska Native Village Water System Needs

The total 20-year need for Alaska native village systems is $1.2 billion. Of this total, approximately $1.1 billion is identified as current needs to ensure the continued provision of safe drinking water. Exhibit 10 shows the total Alaska native village need by project type. The Alaska native village need contributes a disproportionately large share to the total national need on a per-household basis. The need for Alaska native villages differs from other community water systems in that costs for storage in Alaska native villages exceed those for treatment needs.

Exhibit 10: Total 20-Year Need by Project Type for Alaska Native Village Water Systems (in millions of January 2003 dollars)

Categories of Need	Current Need	Future Need	Total Need
Distribution and Transmission	$528.5	$3.5	**$531.9**
Treatment	$232.5	$18.4	**$250.9**
Storage	$320.9	$18.8	**$339.6**
Source	$38.0	$9.3	**$47.3**
Other	$0.8	$0.0	**$0.8**
Total Need	**$1,120.6**	**$49.9**	**$1,170.5**

Note: Numbers may not total due to rounding.

Alaska native village water system needs were adjusted from 1999 Needs Assessment findings to January 2003 dollars.

Does not include the costs associated with the recently promulgated Arsenic Rule and proposed or recently promulgated SDWA regulations.

Total Need Compared to Previous Needs Assessments

The total need of $276.8 billion established by the Agency from the 2003 Needs Assessment substantially exceeds the 1995 Needs Assessment estimate of $167.4 billion and the 1999 Needs Assessment estimate of $165.5 billion.[16]

The 2003 Needs Assessment workgroup identified several factors that came into play in capturing what is believed to be a more accurate representation of total national need for this assessment, as follows:

- First, this was the third Drinking Water Infrastructure Needs Survey and Assessment. Most states had a much better understanding of how the assessment was conducted than in 1995 as well as in 1999.
- For each assessment, questionnaires were sent to all of the largest water systems; therefore, many of the utilities were also familiar with the process.
- For the 2003 Needs Assessment, the questionnaire included several pages prompting systems to more closely examine the current condition of the entire system inventory, and to better consider their replacement and rehabilitation needs for aging infrastructure.
- Criteria for replacement of domestic water meters was modified and the requirement for documentation of system ownership of backflow prevention devices and service lines was removed.
- The interactive Web-based database enabled states to more easily and clearly submit additional information to EPA.
- EPA conducted extensive state training for the 2003 Needs Assessment at several regional locations to help states understand the questionnaire itself and the process to be followed, and to underscore the importance of cooperating with the 2003 Needs Assessment and accurately representing total water system needs.

Needs Assessment Tools

- The Needs Assessment Guide
- The toll free helpline
- The Needs Survey Web site
- Direct access to contractor support

One comparison between the 1999 and the 2003 Needs Assessments is the number of projects submitted. In 2003, the projects submitted for large and medium systems alone totaled 128,600. In 1999, the total projects received for medium and large systems was 61,400. This underscores the effort by states and systems to provide information on infrastructure needs.

Other differences include the following:

- The 1995 Needs Assessment included the $6.3 billion capital need associated with dams and untreated water reservoirs.[17] After EPA completed the first Needs Assessment, these needs were determined to be ineligible for DWSRF assistance and were consequently excluded from the 1999 and 2003 Needs Assessments.

[16] The 1995 and 1999 total needs have been converted to January 2003 dollars for comparison purposes. The 1995 need in 1995 dollars was $138.4 billion. The 1999 need in 1999 dollars was $150.9 billion.

[17] Costs adjusted to 2003 dollars for comparison purposes. Costs were originally $5.2 billion in 1995 dollars.

- Unlike the 1995 Needs Assessment, the 1999 and 2003 Needs Assessments each included $3.4 billion[18] in needs for not-for-profit noncommunity water systems that are eligible for DWSRF funding.

- The varying estimates of costs associated with the proposed and recently promulgated regulations also contribute to the difference between the assessments.

Despite these variations, the fundamental methods used to collect and evaluate needs in 2003 remained largely unchanged from the 1995 and 1999 Needs Assessments. Most importantly, the 2003 Needs Assessment retained the stringent documentation and eligibility requirements of the previous assessments.

Oklahoma Department of Environmental Quality

This photograph shows the installation of a new raw water line to the water treatment plant in Bartlesville, Oklahoma. This DWSRF-funded project was constructed to correct a deficiency in flow to the water treatment plant.

[18] Costs adjusted to 2003 dollars for comparison purposes. Needs for not-for-profit noncommunity water systems were $3.1 billion in 1999 dollars.