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United States Government Accountability Office
Washington, DC 20548

November 30, 2005

The Honorable James M. Inhofe
Chairman, Committee on
Environment and Public Works
United States Senate

The Honorable Mike Crapo
United States Senate

Subject: *Federal Water Requirements: Challenges to Estimating the Cost Impact on Local Communities*

Under the Safe Drinking Water Act and the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act, the Environmental Protection Agency (EPA) has responsibility for protecting public health and welfare, as well as the integrity of our nation's waters. Federal water requirements under these acts affect facilities providing the most basic services at the local level, including drinking water treatment plants and distribution systems; wastewater treatment plants and collection systems; and storm sewer systems, which collect storm water, or the runoff created by rainfall and other types of wet weather. For example, depending on the circumstances, local communities may have to pay for installing new treatment technologies or taking other measures so that community-based or regional facilities can meet applicable water quality standards. Nationwide, there are roughly 53,000 community drinking water systems,[1] 17,000 municipal wastewater treatment plants, and 7,000 communities served by municipal storm sewer collection systems[2] that may be affected by federal water requirements.

While recognizing the public health and environmental benefits of federal water requirements, communities are increasingly voicing concerns about the financial burden imposed by these requirements—in particular, the projected costs of more recent regulations and their cumulative costs over time. Over the years, EPA, water and community associations, and other parties have developed various estimates of some of the different costs related to ensuring clean water and safe drinking water. Additionally, the Unfunded Mandates Reform Act of 1995 requires EPA to prepare a written statement identifying the costs and benefits of federal mandates contained in

[1]There are also roughly 107,000 noncommunity water systems that may be affected by federal drinking water requirements. About 19,000 of these systems are located at facilities such as schools, factories, and hospitals, which regularly serve at least 25 of the same people at least 6 months per year. The remaining noncommunity water systems are located at facilities, such as gas stations and campgrounds, which serve transient populations.
[2]Some municipalities have separate collection systems for wastewater and storm water, and some have combined collection systems. Both types may be affected by federal requirements and are included in this figure.

certain regulations. However, the act does not require EPA to identify the cumulative costs and benefits of multiple regulations. As the Congress considers legislation to provide more resources to communities to address regulatory costs and aging water infrastructure, it is seeking a more complete understanding of the federal water requirements affecting local communities and the cumulative costs associated with implementing them.

In this context, you asked us to determine the cumulative cost of federal water requirements. In conducting this work, we identified some major methodological challenges to developing complete and reliable cost information. We subsequently briefed your staffs on these challenges. This report summarizes the information provided to your staffs during our November 17, 2005, briefing and formally transmits the charts presented during that briefing (see enc. I). As requested, this report provides information on (1) key federal water requirements that local communities are subject to under the Safe Drinking Water Act and the Clean Water Act, (2) the extent to which existing studies provide information on the cumulative cost of such requirements to communities, and (3) the methodological challenges to developing reliable cumulative cost estimates attributable to federal water requirements.

To respond to the first objective, we identified key federal water requirements and verified the accuracy and completeness of the list with EPA. Under the Safe Drinking Water Act, we included key regulations directed at local drinking water systems and excluded regulations that focused on analytical methods or provided clarification to existing requirements. For the Clean Water Act, we included key regulations that typically affect local wastewater treatment plants and municipalities with combined or separate storm sewer systems and excluded regulations that are specific to particular locations or involve technical clarifications. In addition, we met with representatives from more than 10 associations representing water and community interests to obtain their views on which requirements have had, or will have, the most significant cost impacts on local communities. In responding to the second objective, we conducted Internet searches and held discussions with EPA, the Congressional Budget Office, the Congressional Research Service, associations, and others to identify studies that estimated some aspect of costs associated with federal water requirements. Overall, we reviewed over 25 studies published between 1988 and 2005 and summarized their scope, methodology, and findings. For the third objective, we conducted site visits to four communities, which we selected on the basis of three criteria: diversity in community size and level of complexity, community willingness to participate, and diversity of geographic location. During these site visits, we met with community and system managers to determine what information was available to support cumulative cost estimates, identify challenges to developing such estimates, and obtain perspectives on the federal water requirements that have had the most significant impact on their communities. We supplemented this information with examples of methodological challenges identified in existing cost studies and perspectives gathered in interviews with EPA, associations, and others. We conducted our review from February 2005 to October 2005 in accordance with generally accepted government auditing standards.

Summary

The key requirements of the Safe Drinking Water Act and the Clean Water Act that communities must meet focus on limiting the exposure of customers to contaminants in water supplied by community drinking water systems and ensuring that communities prevent pollutants from sewage and diffuse sources, such as streets and construction sites, from reaching surrounding water bodies. (See enc. II for a list and brief description of these federal water requirements.) Under the Safe Drinking Water Act, EPA currently regulates over 90 contaminants, such as arsenic and lead, and is developing regulations on several more. Generally, as required by the Safe Drinking Water Act, EPA's regulations establish a limit, or "maximum contaminant level," for specific contaminants and require water systems to test the water periodically to determine if the quality is acceptable. If contaminant levels are too high, water systems must install new treatment technologies or take other measures to address the problem, such as finding a new water source. However, if it is not economically or technically feasible to ascertain the level of a contaminant, EPA may instead establish a treatment technique to prevent known or anticipated health effects. Other regulations require water systems to notify the public when contaminant levels exceed established limits and provide annual reports summarizing the results of all water quality testing. The Clean Water Act requires wastewater treatment plants to meet minimum technology-based effluent limitations. Plants also may need to implement additional, more stringent limitations, including those necessary to meet water quality standards. In addition, EPA requires municipalities to develop and implement management programs that help prevent pollutants in runoff from reaching surrounding bodies of water. In developing these plans, communities must adopt certain minimum practices, such as controls to reduce or eliminate pollution that collects on streets.

While many parties, including EPA, various water and community associations, and private consulting firms, have developed cost estimates for different aspects of maintaining safe, clean water, these estimates have not provided information on the cumulative costs of complying with federal water requirements, primarily because they were not intended to do so. Some studies focus on developing a broad estimate of the costs of providing safe drinking water or clean water, but do not attempt to separate the costs associated with meeting regulatory requirements from other costs. For example, EPA's 2000 Clean Watersheds Needs Survey presents the cost of projects needed, nationwide, to address water quality and public health problems, which EPA estimated to be $181.2 billion.[3] The study includes the costs of adding capacity to accommodate population growth, replacing aging infrastructure, and complying with requirements in its estimates, among other costs, but it does not distinguish the portion of the total costs that are associated with meeting federal water requirements. In addition, many studies have a narrower scope, focusing on estimating costs for a subset of regulatory requirements and particular time periods, or estimate costs to different entities (e.g., states, private sector). For example,

[3]The estimate includes current and projected abatement costs, in 2000 year dollars, for projects needed to address water quality or public health problems eligible for funding under the Clean Water State Revolving Fund. According to EPA, the quality of data informing the estimate was affected by the variation in the level of effort states put forth in reporting the cost data. We did not independently evaluate the estimation methodology for any of the EPA estimates discussed in this report, nor did we evaluate the validity or the reliability of the survey and other data used to develop these estimates.

EPA's 2003 Drinking Water Infrastructure Needs Survey and Assessment presents an estimate of current and projected costs, for the time period of 2003 to 2022, for drinking water infrastructure investment needs, which totals $276.8 billion.[4] While EPA did distinguish the portion of the total cost attributable to compliance with regulatory requirements ($45.1 billion),[5] the estimates do not include expenditures prior to 2003, and only cover regulations under the Safe Drinking Water Act. (See enc. III for an abbreviated description of the studies we reviewed.) Similarly, although EPA is required to develop cost estimates for some individual regulations, by definition, these estimates are narrow in scope. While the estimates provide a measure of potential costs to comply with individual regulations, which EPA has estimated may reach into the hundreds of millions of dollars for some regulations,[6] the estimates have been subject to criticism for both overestimating and underestimating actual implementation costs. Moreover, adding the projected costs of individual regulations together to obtain an estimate of actual cumulative cost impacts to communities would not provide a meaningful result because, among other reasons, the regulatory estimates are prospective, the range of uncertainty surrounding them is compounded as they are added together, and, in any event, estimates do not exist for all relevant federal water requirements.

Several methodological challenges hinder new efforts to develop reliable cumulative cost estimates, including obtaining accurate and complete cost data, particularly for older requirements; accurately allocating costs (e.g., among jurisdictions that share costs); and establishing a causal link between community investments and federal water requirements. Therefore, any estimate of the cumulative costs of federal water regulations should be viewed in light of the following challenges and consequent data limitations.[7]

- Local communities often lack the institutional knowledge or historical records on the costs of treatment technologies or other operational changes. As a result, local officials may not be able to provide information on the costs associated with installing new treatment technologies or making other operational changes, when such changes occurred, or why they were made.
- Even when data on the costs of treatment technologies or other operational changes are available, local officials often have trouble allocating costs attributable to federal water requirements partly because accounting systems generally track costs by project rather than by federal requirement. Cost

[4]The estimate includes costs, in 2003 year dollars, for projects to protect public health, preserve the physical integrity of water systems, convey treated water to homes and commercial and industrial establishments, and ensure continued compliance with specific Safe Drinking Water Act regulations. According to EPA, there is some uncertainty in the estimates due to sampling error and the use of statistical cost models and regulatory economic analyses.

[5]The estimate includes costs, in 2003 year dollars, for projects directly attributable to specific Safe Drinking Water Act regulations. According to EPA, there is some uncertainty in the estimates due to sampling error and the use of statistical cost models and regulatory economic analyses.

[6]Estimated costs for individual rules can vary widely, and in some instances, reach into the hundreds of millions of dollars. For example, EPA estimated that the Arsenic Rule would cost public water systems between $190 million and $227 million annually (in 1999 year dollars, annualized over 20 years using a commercial discount rate, which approximates 5 percent).

[7]Two previous GAO reports, *Regulatory Burden: Measurement Challenges and Concerns Raised by Selected Companies*, GAO/GGD-97-2 (Washington, D.C.: November 18, 1996), and *Unfunded Mandates: Views Vary About Reform Act's Strengths, Weaknesses, and Options for Improvement*, GAO-05-454 (Washington, D.C.: March 31, 2005) presented similar limitations and concerns regarding the accuracy and completeness of regulatory cost estimates.

allocation is especially difficult when costs are shared by multiple, overlapping jurisdictions or when communities make system or program changes for multiple reasons, such as installing a new treatment technology that both meets federal requirements for safe drinking water and improves the water's aesthetic quality.

- Establishing a causal link between community investments and federal water requirements is also problematic in developing cost estimates. First, in some instances, there is no good measure of what communities would have done in the absence of federal water requirements that can be used as a baseline in developing cost estimates. Second, some investments are made in anticipation of potential federal requirements rather than in response to finalized ones. Consequently, because of the subjective judgments that would have to be made, it is difficult to reliably determine how far in advance of a requirement an investment can be made and still be attributed to that requirement. Third, because some states or regional entities may exercise their authority to establish requirements that are more stringent than the federal standards, some community investments may include costs beyond those fairly attributable to federal requirements. Identifying the federal portion of the costs is often not feasible because the authority and requirements of the multiple levels of government overlap.

Information on the cumulative cost of federal water requirements is critical in determining the nature and extent of the financial burden on local communities. However, given the methodological challenges of obtaining accurate and complete cost data, accurately allocating costs, and establishing a causal link between community investments and federal water requirements, researchers face formidable obstacles in developing a reliable cumulative cost estimate.

Agency Comments and Our Evaluation

We requested comments on a draft of this report from the Administrator of the EPA or his designee. On November 9, 2005, we obtained oral comments from officials with EPA's Office of Water, including the Director of the Office of Ground Water and Drinking Water, the Deputy Director of the Municipal Support Division of the Office of Wastewater Management, and the Associate Director of the Water Permits Division of the Office of Wastewater Management. They generally agreed with our findings and provided some technical comments, which we have incorporated into this report where appropriate.

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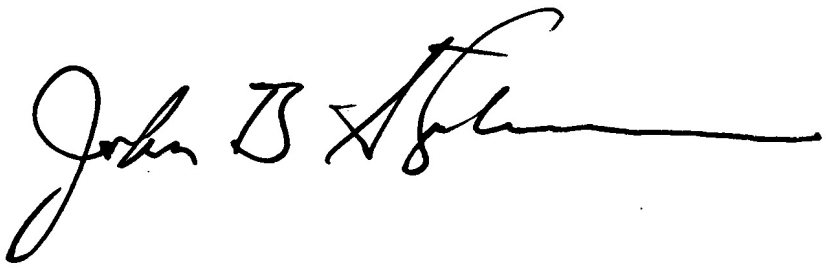
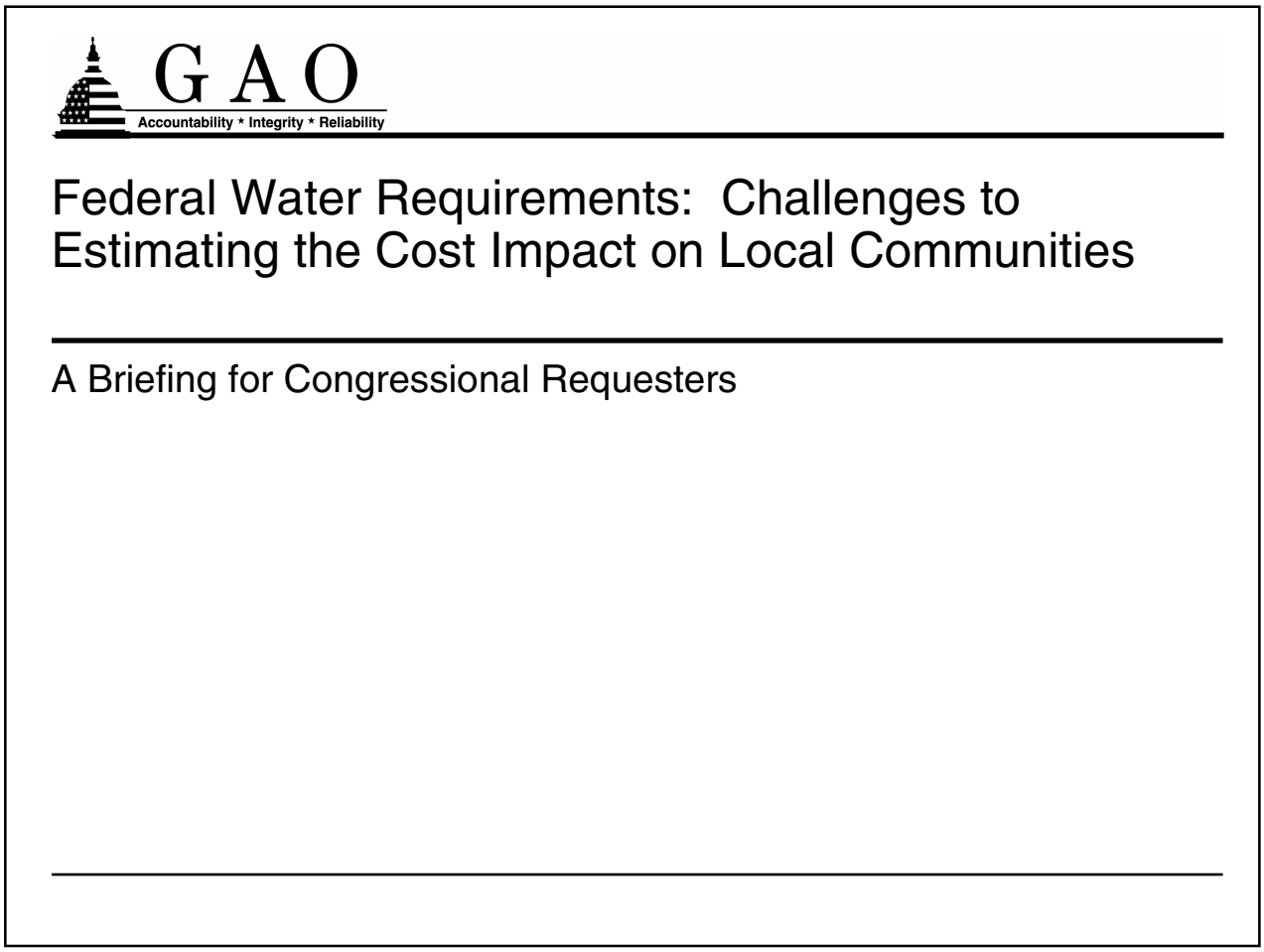
We are sending a copy of this report to EPA. Copies will be made available to others upon request. This report will also be available at no charge on GAO's Web site at http://www.gao.gov.

If you have any questions about this report or need additional information, please contact me at (202) 512-3841 or by e-mail at stephensonj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report include Ellen Crocker, Mark Braza, Nancy Crothers, Laura Gatz, Alyssa Hundrup, Richard Johnson, and Mehrzad Nadji.



John B. Stephenson
Director, Natural Resources
and Environment

Enclosures - 3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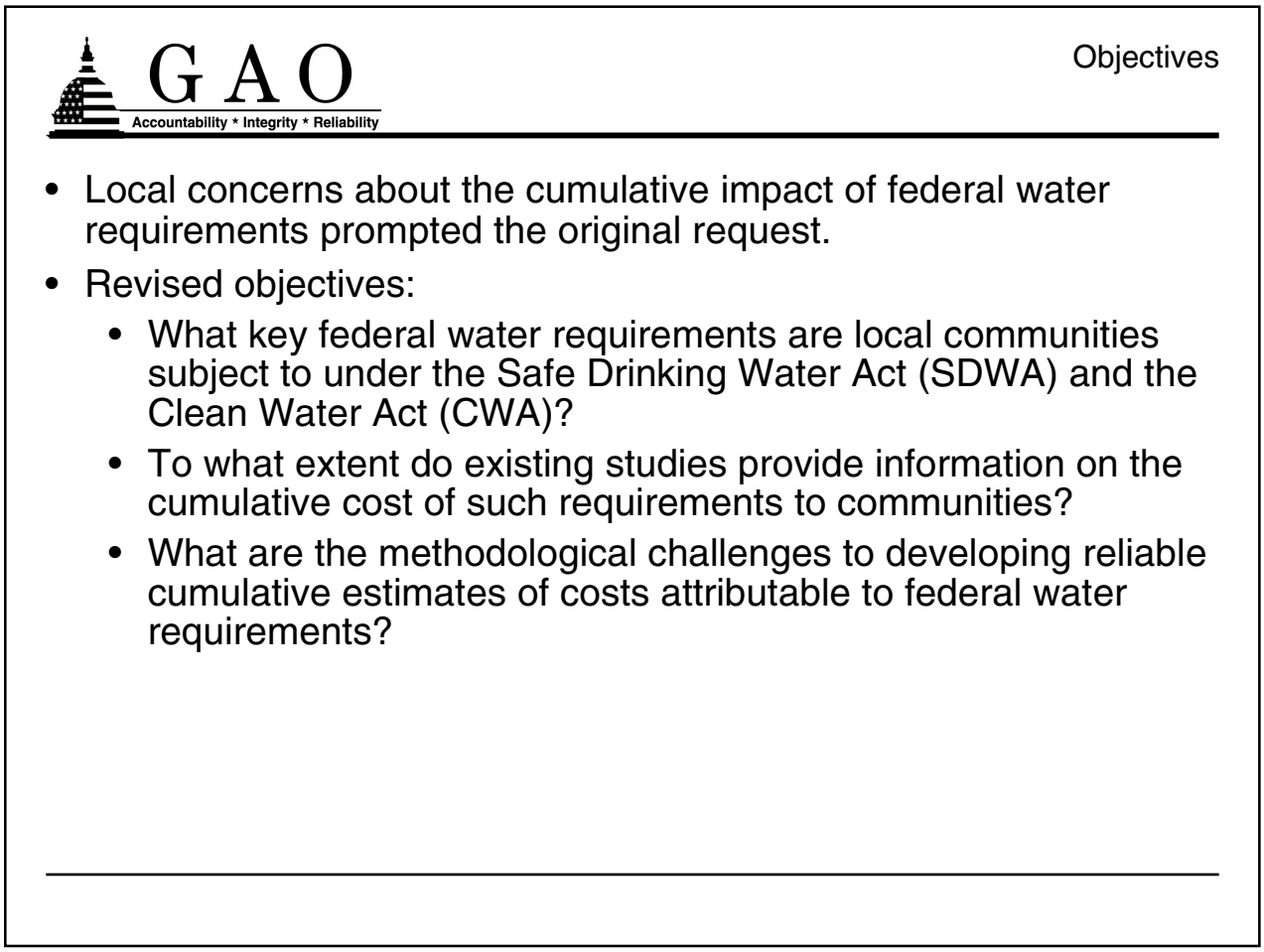
Federal Water Requirements: Challenges to Estimating the Cost Impact on Local Communities
A Briefing for Congressional Requesters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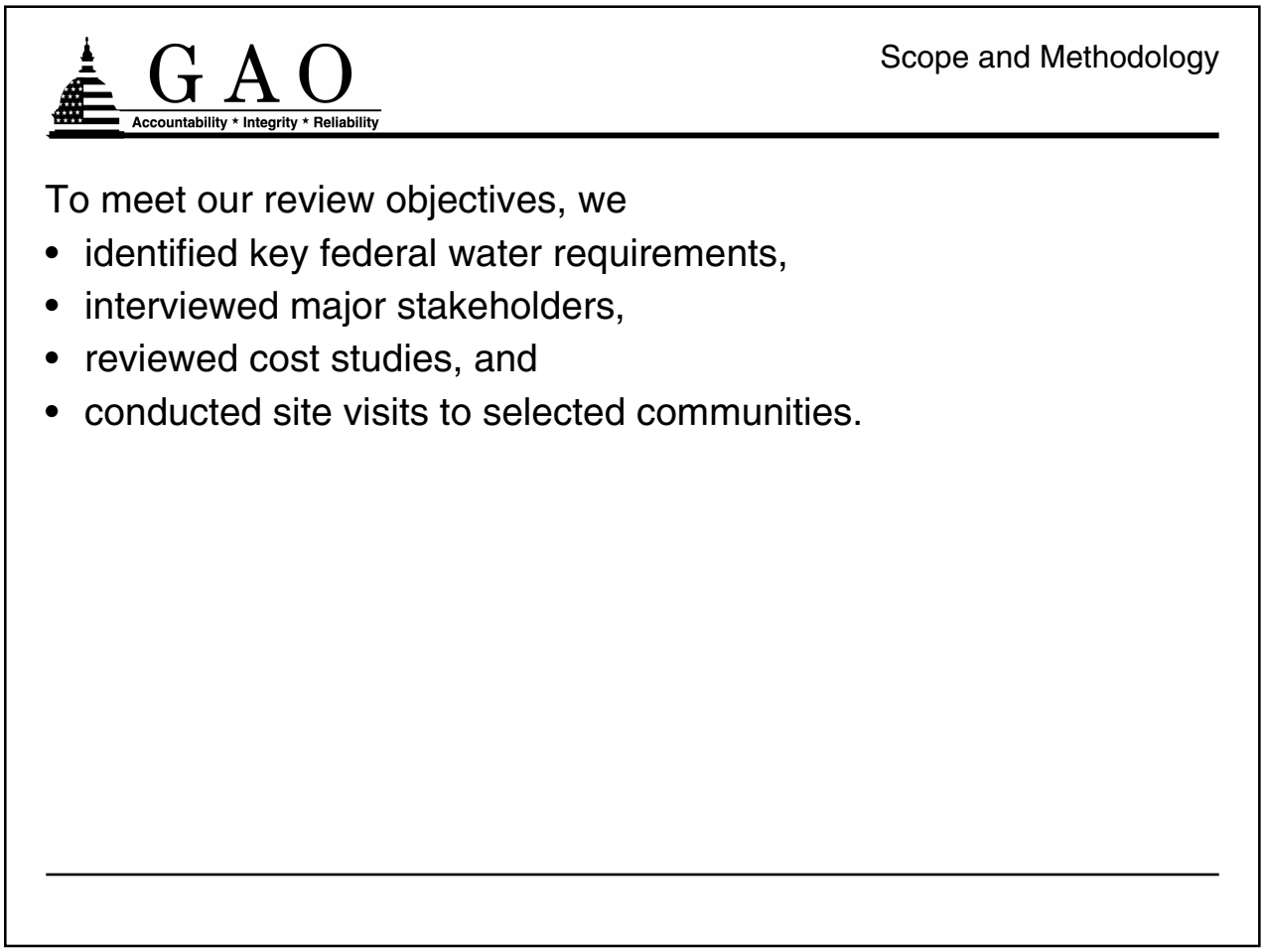
Objectives
• Local concerns about the cumulative impact of federal water requirements prompted the original request.
• Revised objectives:
• What key federal water requirements are local communities subject to under the Safe Drinking Water Act (SDWA) and the Clean Water Act (CWA)?
• To what extent do existing studies provide information on the cumulative cost of such requirements to communities?
• What are the methodological challenges to developing reliable cumulative estimates of costs attributable to federal water requirements?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Scope and Methodology
To meet our review objectives, we
• identified key federal water requirements,
• interviewed major stakeholders,
• reviewed cost studies, and
• conducted site visits to selected communities.

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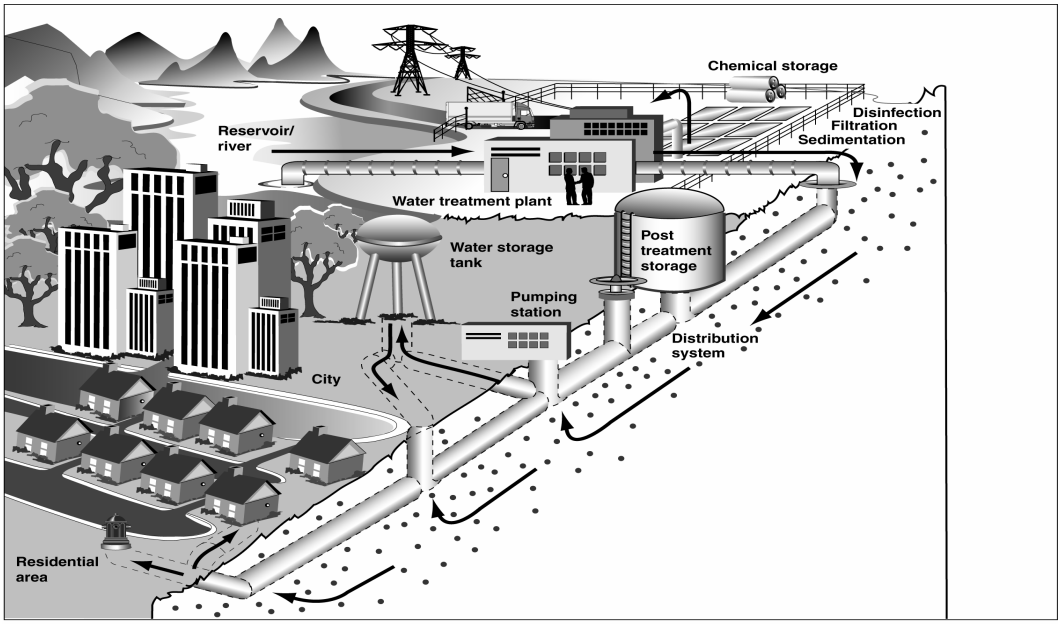
Background

Figure 1: Local-Level Facilities Subject to Federal Water Requirements under SDWA



Source: GAO.

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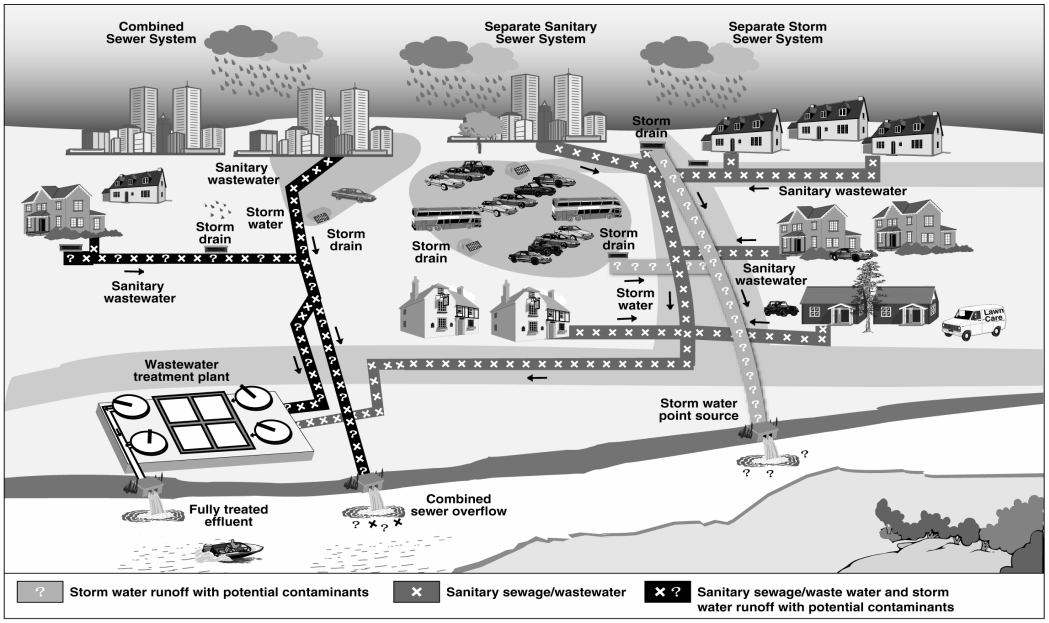
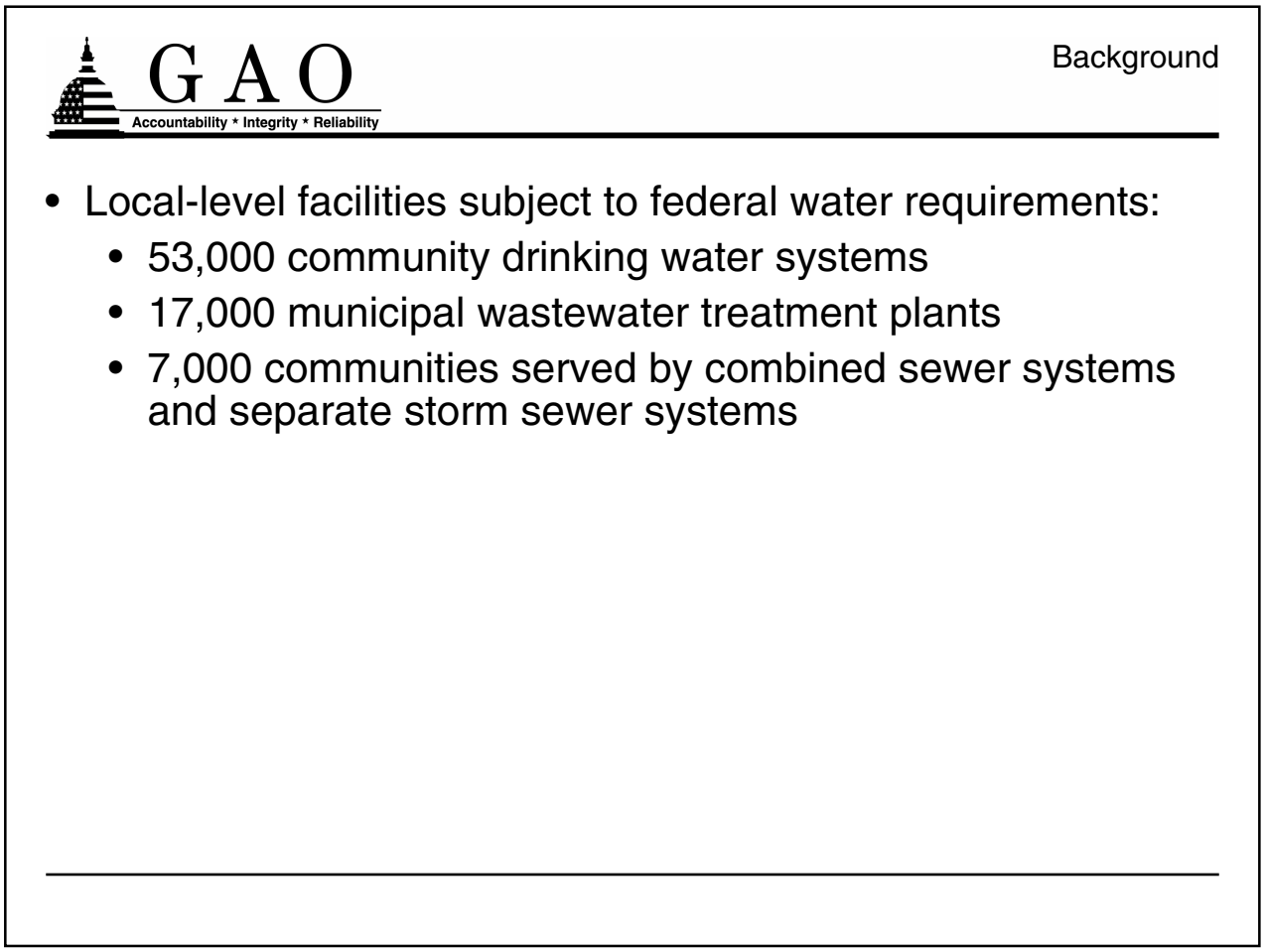
Background

Figure 2: Local-Level Facilities Subject to Federal Water Requirements under CWA



Sources: GAO, Art Explosion (clip art).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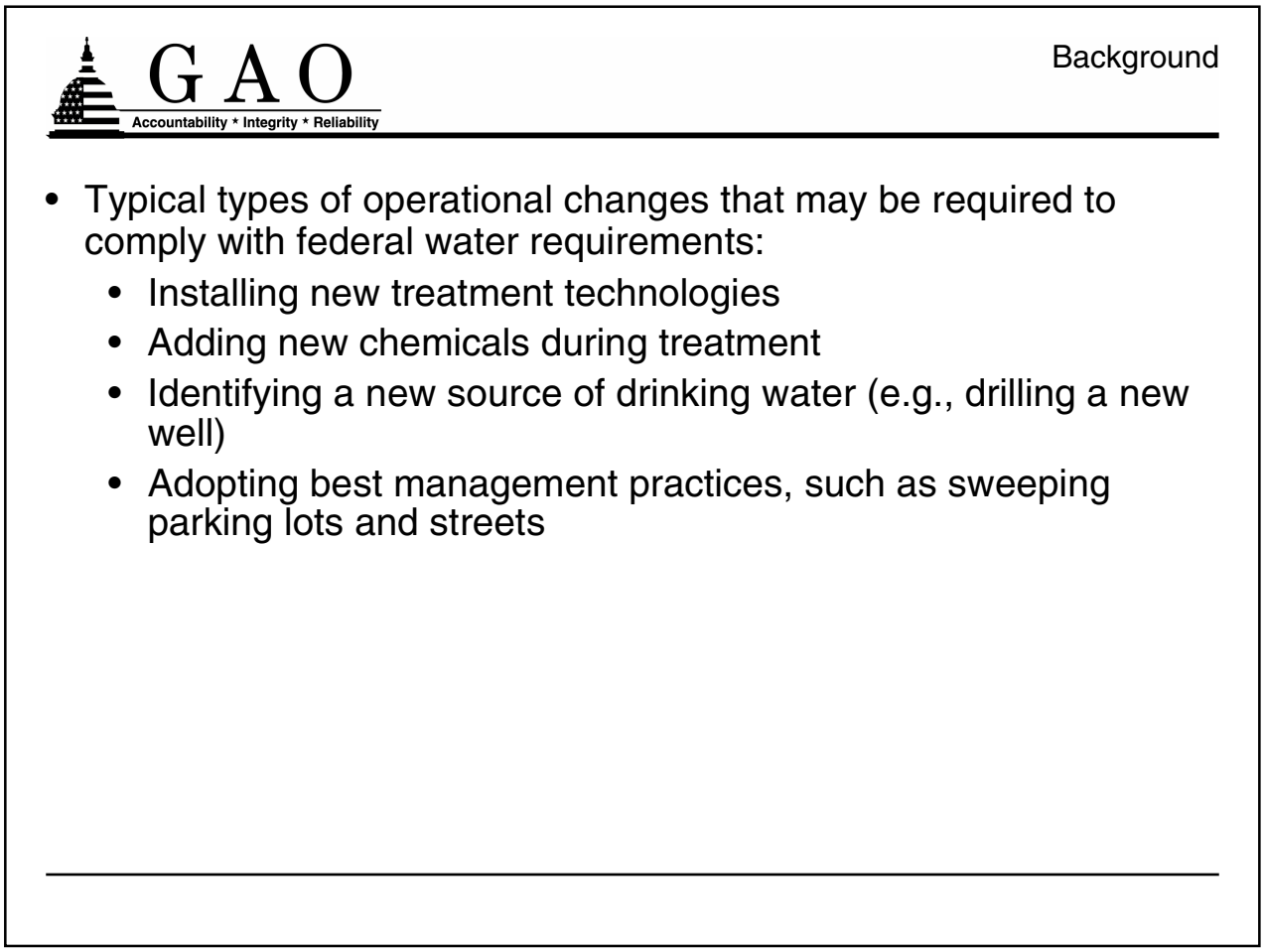
Background
• Local-level facilities subject to federal water requirements:
• 53,000 community drinking water systems
• 17,000 municipal wastewater treatment plants
• 7,000 communities served by combined sewer systems and separate storm sewer systems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Background
• Typical types of operational changes that may be required to comply with federal water requirements:
• Installing new treatment technologies
• Adding new chemicals during treatment
• Identifying a new source of drinking water (e.g., drilling a new well)
• Adopting best management practices, such as sweeping parking lots and streets

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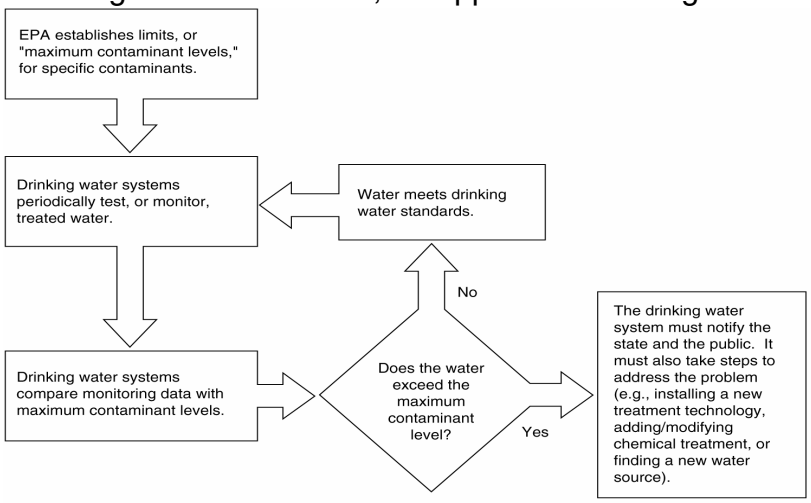
Key Requirements Local Communities Are Subject to under SDWA and CWA

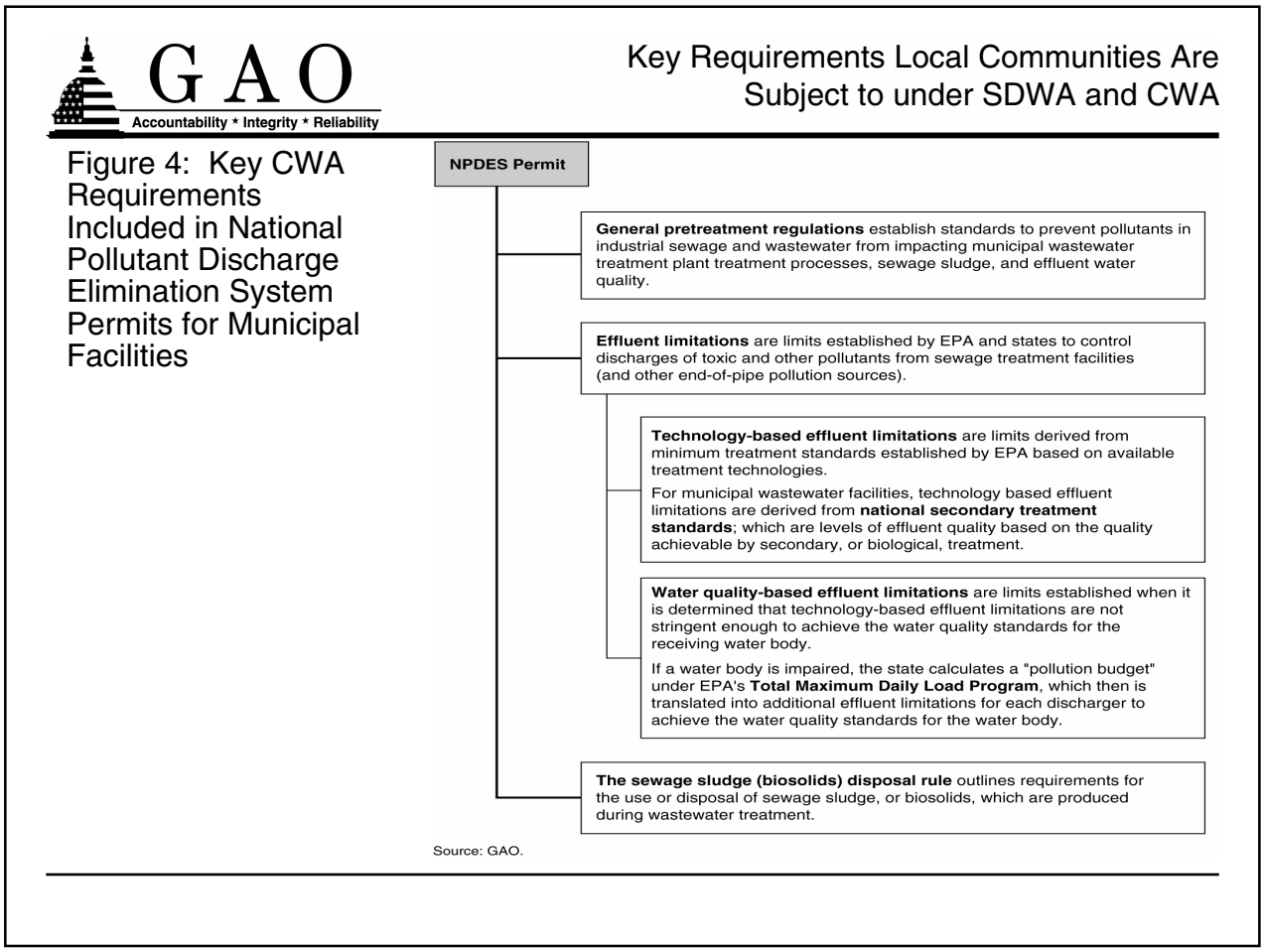
- SDWA – Most drinking water requirements set limits on contaminants; EPA currently regulates over 90.

Figure 3: Drinking Water Standards, as Applied to Drinking Water Systems



Source: GAO.

- If it is not economically or technically feasible to ascertain the level of a contaminant, EPA may instead establish a treatment technique.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Key Requirements Local Communities Are Subject to under SDWA and CWA
Figure 4: Key CWA Requirements Included in National Pollutant Discharge Elimination System Permits for Municipal Facilities
NPDES Permit
General pretreatment regulations establish standards to prevent pollutants in industrial sewage and wastewater from impacting municipal wastewater treatment plant treatment processes, sewage sludge, and effluent water quality.
Effluent limitations are limits established by EPA and states to control discharges of toxic and other pollutants from sewage treatment facilities (and other end-of-pipe pollution sources).
Technology-based effluent limitations are limits derived from minimum treatment standards established by EPA based on available treatment technologies.
For municipal wastewater facilities, technology based effluent limitations are derived from national secondary treatment standards; which are levels of effluent quality based on the quality achievable by secondary, or biological, treatment.
Water quality-based effluent limitations are limits established when it is determined that technology-based effluent limitations are not stringent enough to achieve the water quality standards for the receiving water body.
If a water body is impaired, the state calculates a "pollution budget" under EPA's Total Maximum Daily Load Program, which then is translated into additional effluent limitations for each discharger to achieve the water quality standards for the water body.
The sewage sludge (biosolids) disposal rule outlines requirements for the use or disposal of sewage sludge, or biosolids, which are produced during wastewater treatment.
Source: GAO.

Key Requirements Local Communities Are Subject to under SDWA and CWA

Table 1: Key CWA Requirements Included in NPDES Permits for Municipal Separate Storm Sewer Systems and Municipalities with Combined Sewer Overflows

Municipal Separate Storm Sewer System (MS4)	Combined Sewer System
Storm water regulations require municipalities to •obtain a NPDES permit for all discharges from MS4s and •develop a storm water management program.	The Combined Sewer Overflow Policy requires municipalities to •adopt nine minimum control measures and •develop a long-term control plan.

Key Requirements Local Communities Are Subject to under SDWA and CWA

- Community and water associations' views on the requirements that are having the most significant cost impact on communities:
  - **Safe Drinking Water Act**
    - Arsenic Rule
    - Disinfectants and Disinfection Byproducts Rule
    - Radionuclides Rule
  - **Clean Water Act**
    - Total Maximum Daily Load Program
    - Storm water regulations
    - Combined Sewer Overflow Policy

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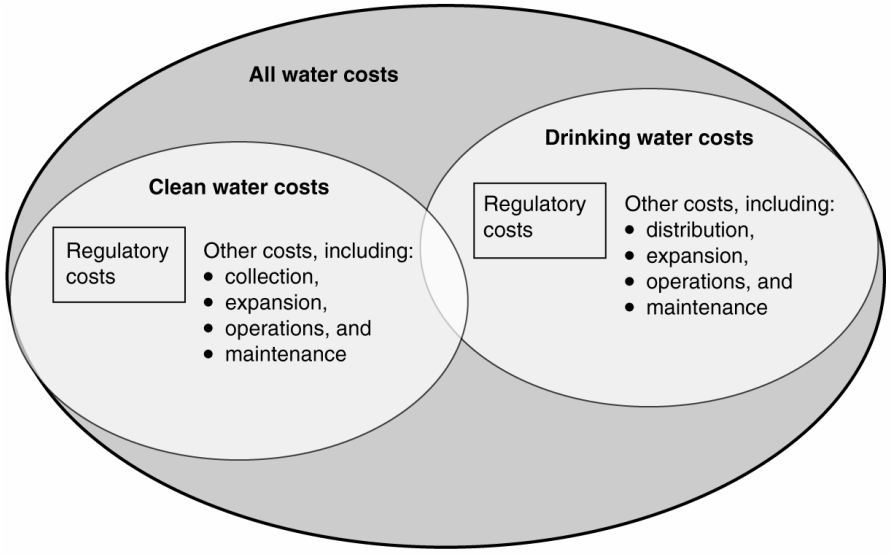
Extent to Which Existing Studies Provide Cumulative Cost Information

Figure 5: Some Studies Focus More Broadly on the Costs of Providing Safe Water or Clean Water, Rather than on Regulatory Costs Alone



Source: GAO.

Extent to Which Existing Studies Provide Cumulative Cost Information

- Other studies estimate costs for
  - a subset of regulatory requirements, particular time periods, or
  - entities other than local communities (e.g., states, private sector).

Extent to Which Existing Studies Provide Cumulative Cost Information

- EPA is required to develop cost estimates for some regulations, but these estimates
  - focus only on single regulations,
  - are prospective,
  - have been subject to criticism for both overestimating and underestimating actual implementation costs, and
  - do not provide a meaningful measure of actual cumulative compliance costs when added together.

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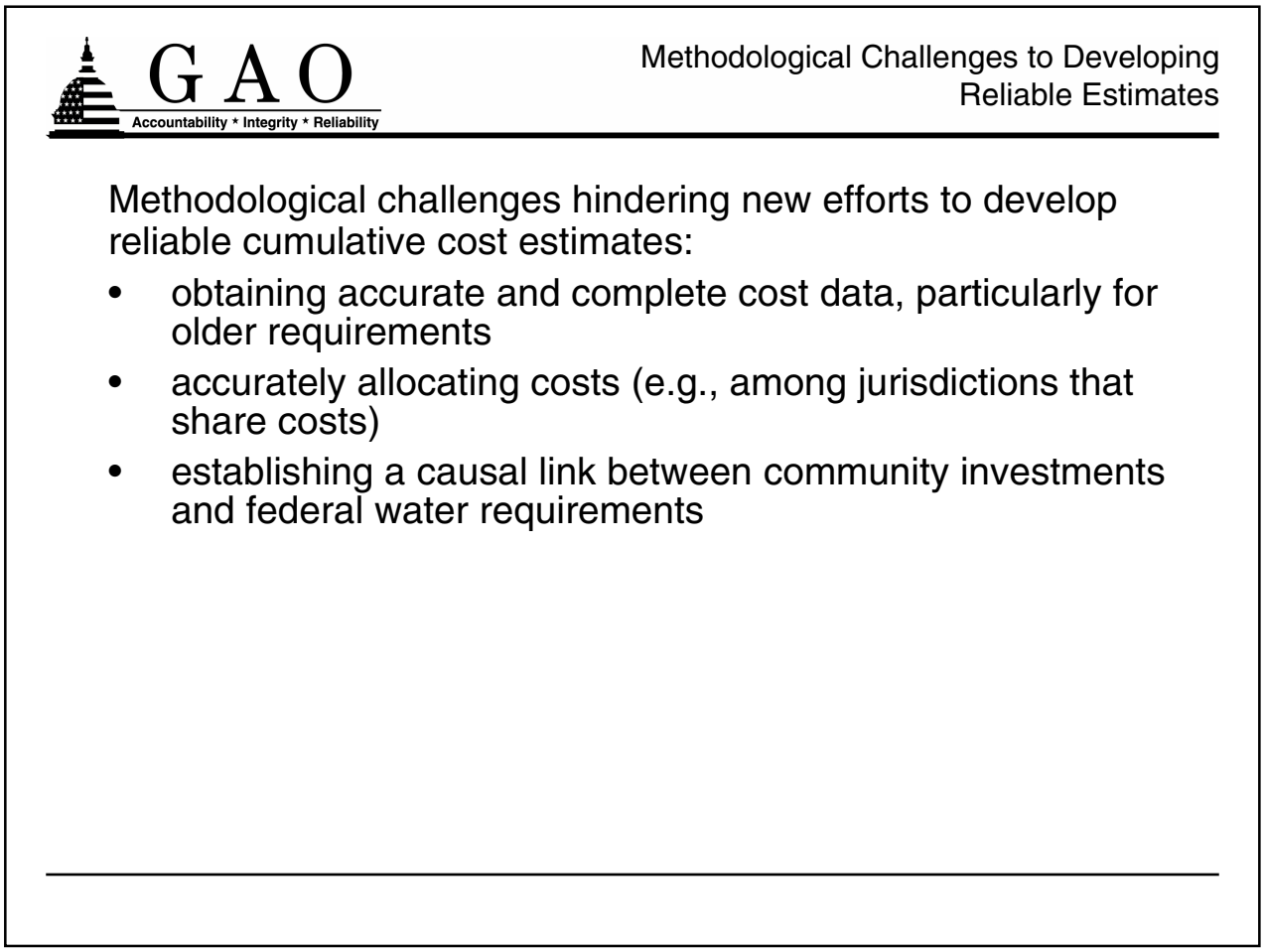
Extent to Which Existing Studies Provide Cumulative Cost Information

(EPA cost estimates continued)

Table 2: Examples of EPA's Cost Estimates

Rule	EPA's Cost Estimate	Uncertainty in Estimate
Phase V Synthetic Organic Chemicals and Inorganic Chemicals Rule	Total annualized cost to public water systems for waste disposal and treatment (excludes monitoring costs): **$1 million - $128 million** (1989 dollars, annualized at 3% over 20 years)	•This range attempts to account for some of the uncertainty in the estimates (e.g., the actual unit costs for treatment and waste disposal) •The range does not account for other uncertainties, (i.e., the extent to which some of the contaminants covered by the regulation occur in drinking water)
Arsenic Rule	Total annualized treatment costs to public water systems: **$190 million - $227 million** (1999 dollars, annualized at approximately 5% over 20 years)	•This range attempts to account for some of the uncertainty in making an estimate (e.g., uncertainty in the actual levels of arsenic in source water) •The range does not account for the uncertainty that some systems would make more costly changes, such as adopting a more expensive treatment technology, or less costly changes, such as finding a new source of water

Note: We did not independently evaluate the methodology used to construct this range of estimates, nor did we evaluate the validity or the reliability of the prior survey and other data used as inputs into the model.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Methodological Challenges to Developing Reliable Estimates
Methodological challenges hindering new efforts to develop reliable cumulative cost estimates:
• obtaining accurate and complete cost data, particularly for older requirements
• accurately allocating costs (e.g., among jurisdictions that share costs)
• establishing a causal link between community investments and federal water requirements

Methodological Challenges to Developing Reliable Estimates

Challenge 1: Obtaining Accurate and Complete Cost Data

- There is a lack of institutional knowledge or historical records on the costs of compliance efforts.
    - **Example:** One community could not provide cost data on past operational changes because some records were not readily available.

      A key official with over 20 years of experience said that even with project cost information, it would be difficult to determine how much of the cost was incurred as a result of federal requirements.

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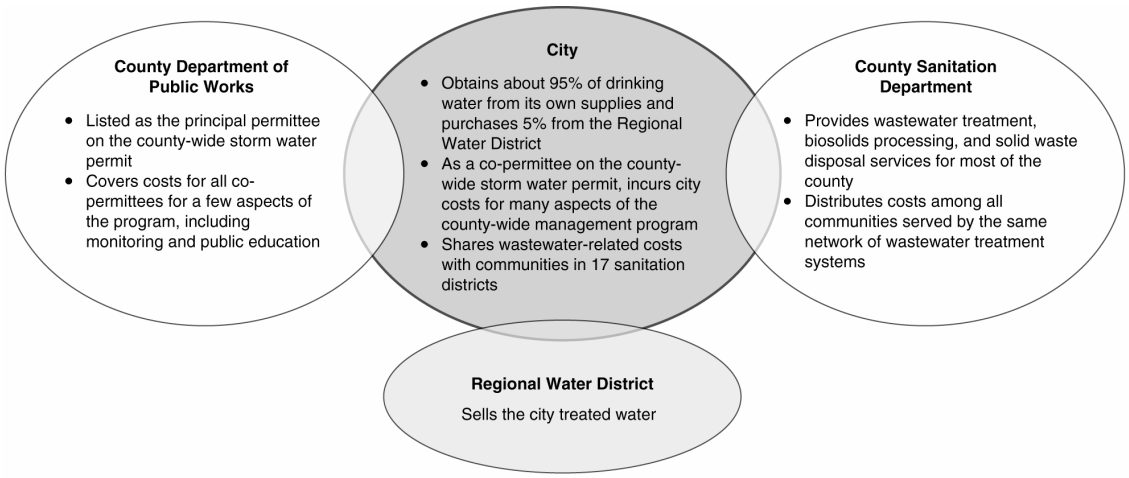
Methodological Challenges to Developing Reliable Estimates

Challenge 2: Accurately Allocating Costs

- Costs are sometimes shared by multiple, overlapping jurisdictions.

Figure 6: Example of Cost-Sharing among Multiple, Overlapping Jurisdictions in One Community We Visited



Source: GAO.

Methodological Challenges to Developing Reliable Estimates

(Challenge 2 continued)

- Communities generally track costs by project rather than by federal requirement; projects may involve system or program changes that serve multiple purposes or impose indirect but related costs.
  - **Example:** One city decided to upgrade its treatment to reduce nitrogen levels to meet upcoming NPDES requirements when it expanded its wastewater treatment capacity to serve a growing population.
  - **Example:** A county upgraded the biological, or secondary, treatment in its wastewater facility in response to a federal requirement. Indirect but related costs: (1) building more storage space to handle the additional sludge and (2) installing odor controls on the sludge storage tanks to comply with the Clean Air Act.

Methodological Challenges to Developing Reliable Estimates

Challenge 3: Establishing a Causal Link between Community Investments and Federal Water Requirements

- For some requirements, there is no good baseline measure of what communities would have done in the absence of such requirements.
  - **Example:** To meet federal storm water requirements, the cities in one county are required to sweep streets once a month. The problem in allocating costs is determining what the cities would have done in the absence of the federal requirement. Some cities would have swept their streets anyway.

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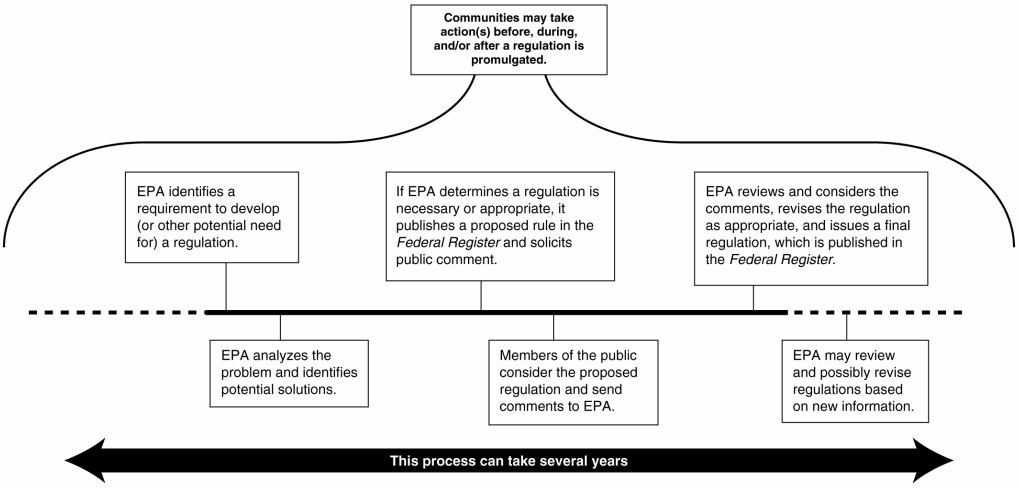
Methodological Challenges to Developing Reliable Estimates

(Challenge 3 continued)

- Some investments are made in anticipation of federal requirements.

Figure 7: General Process for Development of a Regulation and Points Where Communities May Decide to Take an Action That Incurs Costs



Source: GAO.

Methodological Challenges to Developing Reliable Estimates

(Challenge 3 continued)

- **Example:** One community decided to upgrade the biosolids program at its wastewater facility before there was a specific federal requirement covering the use or disposal of biosolids. A community official told us that the change was made in anticipation of the federal requirement.
- **Example:** When another community constructed a new wastewater facility to accommodate population growth, it opted to install a filter, not because it was needed to meet any existing NPDES permit limits, but because it anticipated that future federal requirements could necessitate more advanced treatment.

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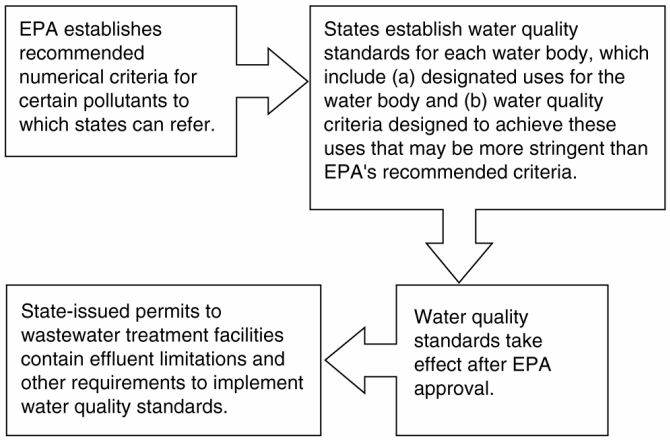
Methodological Challenges to Developing Reliable Estimates

(Challenge 3 continued)

- Some states or regional entities may exercise their authority to establish requirements that are more stringent than the federal criteria (e.g., water quality standards, storm water requirements).

Figure 8: Authority for Establishing Water Quality Standards and Effluent Limits



Source: GAO.

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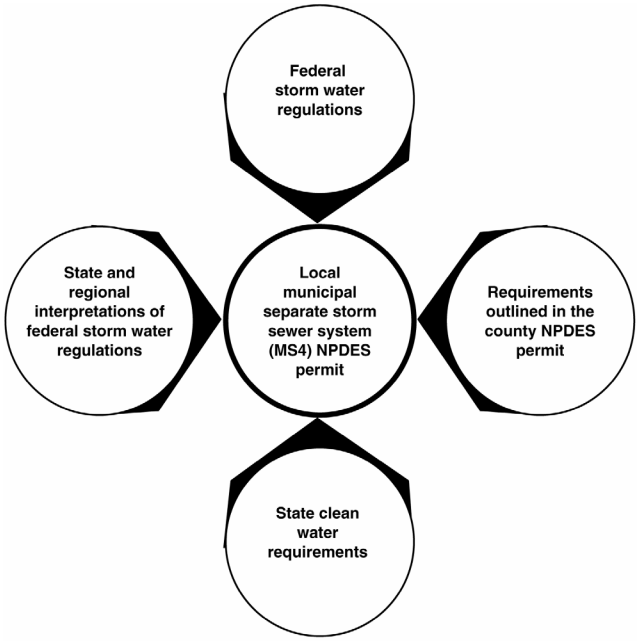
Methodological Challenges to Developing Reliable Estimates

(Challenge 3 continued)

Figure 9: Multiple Regulatory Layers Affect the Impact of Federal Water Requirements on Communities



Source: GAO.

Key Federal Requirements Local Communities Are Subject to under the Safe Drinking Water Act

Title	Date promulgated or proposed[a]	Local-level systems covered	Principal requirements
Disinfection Byproduct Regulations			
Trihalomethanes Rule	November 29, 1979	Community water systems that serve 10,000 or more people and add a disinfectant to their treatment process	Establishes a maximum contaminant level (MCL) and associated monitoring and reporting requirements for total trihalomethanes
Stage 1 Disinfectants and Disinfection Byproducts Rule	December 16, 1998	Community water systems and nontransient, noncommunity water systems that treat their water with a chemical disinfectant; certain requirements for one disinfectant apply to transient noncommunity water systems.	Builds upon and expands the Trihalomethanes Rule; establishes standards for three disinfectants, two groups of organic disinfection byproducts, and two inorganic disinfection byproducts
Stage 2 Disinfectants and Disinfection Byproducts	**Proposed** August 18, 2003	Community water systems and nontransient, noncommunity water systems that add a disinfectant other than ultraviolet light or deliver water treated with a disinfectant other than ultraviolet light	Would augment the Stage 1 Disinfectants and Disinfection Byproducts Rule in part in response to new information concerning the health effects of disinfection byproducts; requires systems to evaluate their distribution systems to identify locations with high disinfection byproduct concentrations (locations will then be used by the systems as the sampling sites for disinfection byproduct compliance monitoring); alters method of calculating compliance with disinfection byproduct MCLs to reduce exposure to peak disinfection byproduct concentrations
Microbial Contaminant Regulations			
Surface Water Treatment Rule	June 29, 1989	Public water systems that use surface water or ground water under the direct influence of surface water	Establishes maximum level contaminant goals for *Giardia lamblia*, viruses, and *Legionella*, and establishes treatment technique requirements to protect against the health effects of exposure to these contaminants (by establishing criteria under which filtration is required, as well as disinfection requirements)
Total Coliform Rule	June 29, 1989	Public water systems	Sets an MCL, monitoring requirements (which are based on the population served), and analytical requirements for total coliform bacteria; requires routine monitoring by all public water systems, periodic sanitary surveys for small systems, and additional monitoring for systems that detect coliform contamination

Interim Enhanced Surface Water Treatment Rule	December 16, 1998	Public water systems that serve more than 10,000 people and use surface water or ground water under the direct influence of surface water	Requires large systems to control microbial contaminants, particularly *Cryptosporidium*; sets a maximum contaminant level goal for *Cryptosporidium*; and builds on the treatment technique requirements of the Surface Water Treatment Rule
Filter Backwash Recycling Rule	June 8, 2001	Public water systems that use surface water or ground water under the direct influence of surface water, use direct or conventional filtration processes, and recycle certain process waters	Adds further protections to ensure treatment processes effectively remove *Cryptosporidium* by requiring systems to review their recycle practices and, where appropriate, make any necessary changes to recycle practices that may compromise microbial control
Long Term 1 Enhanced Surface Water Treatment Rule	January 14, 2002	Public water systems that serve fewer than 10,000 and use surface water or ground water under the direct influence of surface water	Requires small systems to improve control of microbial contaminants, particularly *Cryptosporidium*, by strengthening filtration requirements and addressing risk trade-offs with disinfection byproducts; builds on the treatment technique requirements established for large systems in the Interim Enhanced Surface Water Treatment Rule
Ground Water Rule	**Proposed** May 10, 2000	Public water systems that use ground water	Establishes treatment techniques for systems using groundwater; specifies the appropriate use of disinfection in ground water, requires surveys and assessments, and requires any system with significant deficiencies to take corrective actions
Long Term 2 Enhanced Surface Water Treatment Rule	**Proposed** August 11, 2003	Public water systems that use surface water or ground water under the direct influence of surface water	Builds upon the treatment techniques for *Cryptosporidium* that were established for large systems by the Interim Enhanced Surface Water Treatment Rule and for small systems by the Long Term 1 Enhanced Surface Water Treatment Rule; requires source water monitoring for *Cryptosporidium*, additional *Cryptosporidium* treatment for filtered systems, and inactivation of *Cryptosporidium* by unfiltered systems
Other Contaminant Regulations			
Fluoride Rule	April 2, 1986	Community water systems	Sets an MCL for fluoride
Phase I - Synthetic Organic Chemicals Rule	July 8, 1987	Community water systems and nontransient, noncommunity water systems	Establishes MCLs for eight volatile synthetic organic chemicals
Phase II - Synthetic Organic Chemicals and Inorganic Chemicals Rules	January 30, 1991	Primarily community water systems and nontransient, noncommunity water systems	Establish MCLs for 26 synthetic organic chemicals and 7 inorganic chemicals
Lead and Copper Rule	June 7, 1991	Community water systems and nontransient, noncommunity water systems	Establishes maximum contaminant level goals for lead and copper and establishes “action levels” that, when exceeded, trigger treatment technique requirements (including corrosion control treatment, public education, and, under some circumstances, source water treatment and lead service line

			replacement)
Phase V - Synthetic Organic Chemicals and Inorganic Chemicals Rule	July 17, 1992	Community water systems and nontransient, noncommunity water systems	Establishes MCLs for 18 synthetic organic chemicals and 5 inorganic chemicals
Information Collection Rule	May 14, 1996	Large public water systems (surface water systems serving at least 100,000 and ground water systems serving at least 50,000)	Required systems to collect and report information on the occurrence of disinfectant residuals, disinfection byproducts, and disease-causing microorganisms in drinking water and on the effectiveness of various treatment technologies to reduce levels of these contaminants; this data collection effort is complete and no longer imposes requirements on systems.
Radionuclides Rule	December 7, 2000	Community water systems	Sets an MCL for uranium and revises monitoring requirements for other radionuclides
Arsenic Rule	January 22, 2001	Community water systems and nontransient, noncommunity water systems	Establishes a new MCL for arsenic
Radon Rule	**Proposed** November 2, 1999	Community water systems that use ground water or mixed ground water and surface water	Proposes two options: (1) developing a multimedia mitigation program at the state level to reduce radon in indoor air or (2) developing a local program to reduce radon in water to a greater extent
Customer Awareness Regulations			
Consumer Confidence Reports Rule	August 19, 1998	Community water systems	Requires systems to prepare and provide to their customers annual confidence reports on the quality of the water delivered by the systems
Public Notification Rule	May 4, 2000	Public water systems	Requires systems to notify the people it serves of (1) violations of drinking water regulations, (2) applicable variances and exemptions from the regulations, and (3) other situations posing a risk to public health from the drinking water; establishes minimum requirements regarding the form, manner, frequency, and content of the public notification

Notes:

Public water system is a water system that regularly supplies drinking water to at least 15 service connections or 25 people daily for at least 60 days a year. A public water system is either a “community water system” or a “noncommunity water system.”

Community water system is a public water system that serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

Transient noncommunity water system is a public water system that does not regularly serve at least 25 of the same people at least 6 months per year (e.g., gas stations, campgrounds).

Nontransient noncommunity water system is a public water system that regularly supplies water to at least 25 of the same people at least 6 months per year (e.g., schools, factories, office buildings, and hospitals that have their own water systems).

[a] Date of proposal is given for rules not yet finalized.

Key Federal Requirements Local Communities Are Subject to under the Clean Water Act

NPDES program areas and requirements	Date promulgated	Municipal systems/facilities covered	Key requirements
Secondary treatment standards			
Secondary Treatment Standards	August 17, 1973 (as amended)	Publicly owned treatment works (POTW)[a]	Establish required levels of effluent quality based on the quality achievable by secondary, or biological, treatment
Water quality and technology-based permitting			
Surface Water Toxics Control Program and Water Quality Planning and Management Program (governing regulation for the Total Maximum Daily Load Program)	July 24, 1992	States are directly covered; POTWs discharging to impaired waters are indirectly affected.[b]	Specifies that states must submit their lists of impaired waters, including waters targeted for total maximum daily load (TMDL) development to EPA every 2 years and provide documentation to support the states' determinations; eventually, POTWs could be required to meet more stringent limits on the discharge of some pollutants.
Monitoring Requirements for Publicly Owned Treatment Works and Other Treatment Works Treating Domestic Sewage	August 4, 1999	POTWs and other treatment works treating domestic sewage	Require monitoring for certain toxic and other pollutants; the extent of pollutant monitoring required varies by POTW size.
Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards for the Landfills Point Source Category	January 19, 2000	Municipalities that (1) own or operate new or existing hazardous or nonhazardous landfill facilities regulated, respectively, under Subtitle C and Subtitle D of the Resource Conservation and Recovery Act and (2) collect and discharge landfill generated wastewater to surface waters of the United States (unless the landfills are directly associated with other industrial or commercial facilities)	Establish technology-based effluent limitations for wastewater discharges associated with the operation and maintenance of these landfill facilities
NPDES – Final Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities	July 9, 2004	Facilities (including municipally owned facilities) existing prior to January 17, 2002, that (1) are point sources; (2) as their primary activity both generate and transmit electric power or generate electric power for sale to another entity for transmission; (3) use or propose to use one or more cooling water intake structures with a total design intake flow of 50 million gallons per day or more to withdraw water from waters of the United States; and (4) use 25	Establish national performance standards based on the best available technology to protect aquatic organisms from being killed or injured by cooling water intake structures

		percent of water withdrawn exclusively for cooling water	
Combined sewer overflows			
Combined Sewer Overflow Control Policy, Codified by the Consolidated Appropriations Act for Fiscal Year 2001	April 19, 1994	Combined sewer systems that overflow as a result of wet weather events	Establishes a consistent national approach for controlling discharges from combined sewer overflows to the nation's waters; among other things, municipalities must implement minimum technology-based controls and develop long-term combined sewer overflow plans to meet water quality standards.
Municipal separate storm sewer systems			
Permit Application Regulations for Storm Water Discharges (Phase I Storm Water Regulations)	November 16, 1990	Discharges from large and medium municipal separate storm sewer systems (those serving more than 100,000 people)	Require large and medium municipal separate sewer systems to obtain NPDES permits for storm water discharges and set forth the required components of municipal storm water quality management plans
Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges (Phase II Storm Water Regulations)	December 8, 1999	Discharges from small municipal separate storm sewer systems (those serving less than 100,000 people)	Extend storm water requirements to smaller municipal separate storm sewer systems
National pretreatment program			
General Pretreatment Regulations for Existing and New Sources	June 26, 1978, as amended January 28, 1981	POTWs	Require most major POTWs to develop a locally run pretreatment program to ensure that nondomestic users of the municipal system have controls in place to prevent the introduction into POTWs of pollutants that will interfere with operations or pass through the POTW untreated
Biosolids (sewage sludge)			
Standards for Use or Disposal	February 19, 1993	POTWs and other treatment works treating domestic sewage sludge	Establish requirements for the final use and disposal of sewage sludge; numerical limits on the pollutant concentrations in sewage sludge; management practices; and, in some cases, operational requirements

[a] A POTW is a state or municipally owned system or device used to store, treat, recycle, or reclaim municipal sewage or liquid industrial wastes. The term includes treatment plants.

[b] If a state lists a water body as impaired, it must eventually develop, for each pollutant causing an impairment, a TMDL—the amount of the pollutant that the water body can receive, taking into account seasonal variations and a margin of safety, and still meet water quality standards. To implement a TMDL, states allocate pollutant loadings among specific sources, such as local wastewater treatment plants, and incorporate the loads into the state's water quality management plans and NPDES permits.

Summary of Selected Cost Studies

Title	Description
EPA studies	
Drinking Water Infrastructure Needs Survey and Assessment: Third Report to Congress, EPA, 2005.	The purpose of this study was to estimate the national infrastructure needs for public drinking water systems. EPA conducted a survey to project the estimated costs, for the time period of 2003 to 2022, for the approximately 75,000 public water systems eligible to receive assistance from the Drinking Water State Revolving Fund. The assessment includes costs needed to protect public health, preserve the physical integrity of water systems, convey treated water to homes and commercial and industrial establishments, and ensure continued compliance with specific Safe Drinking Water Act regulations. EPA also conducted similar surveys in 1995 and 1999.
Report to Congress: Impacts and Control of CSOs and SSOs, EPA, 2004.	This report documents the extent of human health and environmental impacts caused by municipal combined sewer overflows (CSO) and sanitary sewer overflows (SSO), including the location of discharges causing such impacts, the volume of pollutants discharged, the resources spent by municipalities to address these impacts and the projected costs to reduce CSOs and SSOs, and the technologies used by municipalities to address these impacts. EPA reported expenditures, primarily for infrastructure investments such as sewer system replacement and rehabilitation, going back to 1970 and projected future needs over a 20-year period.
Clean Watersheds Needs Survey 2000: Report to Congress, EPA, 2003.	The purpose of this study was to estimate the total national need for water quality programs and projects under the Clean Water Act. EPA conducted a survey to estimate the costs for needs that existed as of January 1, 2000; had an indeterminate future time frame; and were eligible for Clean Water State Revolving Fund assistance. EPA collected documentation from facilities involved with water quality management, such as wastewater treatment plants and municipal separate storm sewer systems. The assessment includes projected costs for wastewater treatment, collection, and conveyance; CSO correction; storm water management programs; and nonpoint source pollution control. EPA conducted a similar assessment in 1996 and has collected information about Clean Water Act needs since 1972.
Community Water System Survey 2000, EPA, 2002.	This report summarized information from a survey of a nationally representative sample of community drinking water systems on their financial and operating characteristics. The survey collected information from water systems on such characteristics as the source of their water; the size of their system; and the capital expenditures they made over a 5-year period. EPA conducted similar surveys in 1976, 1982, 1986, and 1995.
The Clean Water and Drinking Water Infrastructure Gap Analysis, EPA, 2002.	The purpose of this study was to estimate the gap between projected clean water and drinking water investment needs, over the 20-year period from 2000 to 2019, including needs related to regulatory compliance, and levels of spending at the time the analysis was conducted. The scope of the report includes both capital and operations and maintenance costs for all clean water and drinking water services. The analysis used the clean water and drinking water needs surveys (see above) as a starting point and then made adjustments, based on several alternative assumptions.
The National Costs of the Total Maximum Daily Load Program (Draft Report), EPA, 2001.	This report estimates the national costs of developing and implementing the Total Maximum Daily Load (TMDL) Program, under the Clean Water Act. EPA calculated the annual costs to states and EPA for listing impaired waters and developing TMDLs. EPA also estimated the annual costs to pollutant sources—such as industrial dischargers and wastewater treatment plants—to implement the TMDLs for the approximately 20,000 impaired waters that were identified at the time of the study.
A Retrospective Assessment of the Costs of the Clean Water Act: 1972 to 1997, prepared for EPA by George Van Houtven, Smita Brunnermeier, and Mark Buckley, Center for Economics Research, 2000.	This study estimates the nationwide costs of water pollution abatement expenditures by both public and private entities under the Clean Water Act. The analysis focuses on the incremental annual costs of requirements under the Clean Water Act between 1972 and 1997.
Estimates of the Total Benefits and Total Costs Associated with Implementation of the 1986 Amendments to the Safe Drinking	The purpose of this study was to estimate the total benefits and costs for all of the drinking water regulations specified in the 1986 Amendments to the Safe Drinking Water Act. The regulations included in the analysis cover: volatile organic chemicals, fluoride, the surface water treatment rule, the total coliform rule, the lead and copper rule, phase

Water Act, prepared for EPA by Wade Miller Associates, Inc., 1990.	II inorganic and synthetic organic chemicals, radionuclides, disinfection requirements, phase V inorganic and synthetic organic chemicals, and arsenic. The study presented aggregate national-scale costs for implementing these rules on an annual basis in addition to providing cost-benefit comparisons for the regulations at the individual water system level and at the household level. Similar studies were conducted in 1987 and 1989.
Environmental Investments: The Cost of a Clean Environment: A Summary, EPA, 1990.	This summary report presents data on environmental pollution control costs from 1972 through 1987 and then projects the costs for each subsequent year to the year 2000 under a number of different scenarios. Cost estimates are included for actions taken pursuant to each of the major federal environmental pollution control statutes (including the Clean Water Act and Safe Drinking Water Act). Separate costs were developed for each of the various environmental media, including air, water, land, and useful chemicals (such as pesticides). Cost estimates were also broken down by the economic sector that would directly incur the cost, including EPA, other federal agencies, state and local government, and the private sector. This report summarizes data presented in a much more detailed report also issued in 1990 entitled *Environmental Investments: The Cost of a Clean Environment, Report of the Administrator of the Environmental Protection Agency to the Congress of the United States*.
The Municipal Sector Study: Impacts of Environmental Regulations on Municipalities, EPA, 1988.	This study examined the impacts of 22 environmental regulations that municipalities have to comply with, including 11 drinking water regulations, 3 wastewater treatment regulations, and 1 storm water management regulation. EPA calculated the impacts by looking at the projected increases in user charges (e.g., charges for water and sewer services) per household, and the ability of municipalities to raise needed capital to comply with the additional requirements.
Studies by other federal agencies	
Draft 2005 Report to Congress on the Costs and Benefits of Federal Regulations, Office of Management and Budget, 2005.	This report provides an estimate of the total costs and benefits of regulations reviewed by the Office of Management and Budget (OMB), including a 10-year retrospective of major federal regulations reviewed by OMB, a historical examination of the trends in federal regulatory activity, and discussion of the implementation of the Information Quality Act. OMB's estimates are based on cost estimates found in the agencies' regulatory impact analyses. Federal regulations, including those under the Clean Water Act and Safe Drinking Water Act, were included if, in general, they were projected to have the potential for a significant impact.[a] OMB issues similar reports on a yearly basis.
Future Investment in Drinking Water and Wastewater Infrastructure, Congressional Budget Office, 2002.	This study provides background information on the nation's water systems; presents estimates of future costs for water infrastructure under two scenarios, a low-cost case and high-cost case; and discusses broad policy options for the federal government to support water infrastructure development. The cost estimates are for the annual infrastructure funding needs of drinking water and wastewater systems for the period 2000 to 2019. These needs include capital costs and operations and maintenance costs, which include costs related to regulatory compliance.
The Safe Drinking Water Act: A Case Study of an Unfunded Federal Mandate, Congressional Budget Office, 1995.	This study looked at the costs and benefits of treating drinking water according to the standards set under the Safe Drinking Water Act as a case study of federal mandates. Among other things, the study examined whether the act, at the time the analysis was completed, had imposed large costs on households, had costs that exceed benefits, and had imposed a large fiscal burden on municipalities.
Studies by other entities	
Impact of Unfunded Federal Mandates and Cost Shifts on U.S. Cities: A Preliminary Report on Costs in 59 Cities, The United States Conference of Mayors, 2005.	This report provides information on the survey the U.S. Conference of Mayors conducted to collect cost information on several federal mandates and requirements, including the Safe Drinking Water Act and the Clean Water Act. A total of 59 cities provided information on their recurring annual costs and any one-time costs associated with the mandate for the most recent fiscal year for which the information was available. The U.S. Conference of Mayors also conducted a similar survey in 1993.

[a] All final rules promulgated by an Executive branch agency were included if the rule met any one of the following measures: rules designated as "economically significant" under section 3(f)(1) of Executive Order 12866; rules designated as "major" under 5 U.S.C. 804(2); and rules designated as meeting the threshold under 2 U.S.C. 1532.

Unfunded Mandates: A Snapshot Survey, National Association of Counties, 2005.	The purpose of this report was to provide information on the impact of unfunded mandates on county governments. The Association collected cost information for 10 federal mandates, including the Safe Drinking Water Act and the Clean Water Act, by surveying member counties from across the country on their estimated costs to comply with each of the mandates for fiscal years 2003, 2004, and projected 2005. The Association also conducted a similar survey in 1993.
Safe Drinking Water Act: Costs of Compliance, Robert S. Raucher and John Cromwell, Mercatus Center, George Mason University, 2004.	This paper examines the national costs associated with federal drinking water regulations issued as a result of the 1996 Safe Drinking Water Act amendments. Building on EPA's cost estimates published for each individual regulation and other available research, the study presents cost estimates for each major national rule finalized under the act since the 1996 amendments. The cost estimates are then aggregated, along with estimates for regulations issued before 1996, to come up with a total cost estimate for drinking water regulations issued since 1986.
The Cost of Regulations Implementing the Clean Water Act, Joseph M. Johnson, Mercatus Center, George Mason University, 2004.	The purpose of this study was to estimate the cost of implementing water pollution control regulations under the Clean Water Act between 1972 and 2001. Cost estimates were developed for both the government (including state and local) and the private sector. Estimates were largely based on government and private expenditure data collected through the U.S. Census Bureau's Pollution Abatement and Control Expenditures survey.
Census Data Shed Light on U.S. Water and Wastewater Costs, Scott J. Rubin, American Water Works Association Journal, April, 2005.	This study analyzes U.S. Census Bureau data from the Public Use Microdata Areas to estimate the cost of water and wastewater service for households with various characteristics, such as annual household income, type of housing unit, and size of the housing unit.
Dawn of the Replacement Era: Reinvesting in Drinking Water Infrastructure, American Water Works Association, 2001.	This report estimates the funding that may be needed over a 30-year period, nationwide, for the replacement of worn-out drinking water pipes and associated drinking water infrastructure. The estimate is based on an analysis of 20 utilities geographically distributed throughout the nation.
The AMSA 2002 Financial Survey: A National Survey of Municipal Wastewater Management Financing and Trends, Association of Metropolitan Sewerage Agencies, 2002.	The purpose of this study was to report on current practices in financing and managing public wastewater treatment agencies across the nation. The Association of Metropolitan Sewerage Agencies, an association that represents public wastewater treatment agencies, surveyed a sample of its membership on general utility information, such as the size of service area and the volume of treatment; financial information, such as capital improvement needs; rate information, including the rate structure used; and staffing and salary information, such as number of staff and licensing requirements. The 2002 survey updates and expands on eight previous surveys conducted since 1981.
Clean and Safe Water for the 21st Century: A Renewed Commitment to Water and Wastewater Infrastructure, Water Infrastructure Network, 2000.	This report discusses the value of clean and safe drinking water and wastewater; provides a historic and future perspective on investments to water and wastewater infrastructure systems; estimates the cost of building, operating, and maintaining needed drinking water and wastewater facilities over a 20-year period; and discusses the federal role in financing water and wastewater infrastructure projects.
Implementing a Regulatory Budget: Estimating the Mandated Private Expenditure of the Clean Air Act and Safe Drinking Water Act Amendments, Harvey S. James, Center for the Study of American Business, Washington University, Working Paper 161, August 1996.	This study examines the various problems that arise in measuring regulatory costs and, in that light, proposes a feasible methodology for carrying out a regulatory budget. The methodology was then applied to the recent amendments of the Clean Air Act and the Safe Drinking Water Act to assess the feasibility of administering a regulatory budget. In conducting the study, the author estimated the compliance costs of the Clean Air and Safe Drinking Water Acts, which for the Safe Drinking Water Act included compiling data from EPA and American Water Works Association estimates for the rules authorized by the 1986 amendments.

Note: We did not include studies specific to state and local entities in our review.

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