U.S. GOVERNMENT ACCOUNTABILITY OFFICE
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Congressional Committees

Alternative Drinking Water Systems: Use by Very Small Communities, Related Cost Savings, and Technical Assistance Provided by EPA and USDA

Nationwide, many small communities—those with populations of 10,000 or fewer people—face challenges addressing their drinking water needs.[1] These communities may be unable to afford construction of a new system or replace aging infrastructure. Communities typically pay for drinking water infrastructure through rates charged to users of these systems and other sources, such as local taxes. Small communities have fewer users across which to spread rate increases, making operation, maintenance, and infrastructure projects less affordable. In addition, according to Environmental Protection Agency (EPA) documents, small communities face other challenges that limit their ability to achieve and maintain system sustainability, including challenges in recruiting and retaining certified operators and maintaining expertise to choose, operate, and maintain systems. For the purposes of this report, community water systems that serve a population of 500 or fewer people are referred to as "very small".[2] Nearly 4.6 million people depend on these very small systems that compose more than half of the nation's community water systems (26,995 of 49,678), according to estimates in EPA's Safe Drinking Water Information System (SDWIS), which contains data on public water systems.[3]

According to EPA documents, new or nonconventional approaches have the potential to provide small communities with better or more cost-effective access to drinking water.[4] As part of its National Water Program, EPA promotes development and use of innovative technology to advance the agency's goal of clean and safe water and sustainable water utilities.[5] Over the past several years, Congress has enacted legislation related to facilitating the use of innovative

[1]GAO, *Rural Water Infrastructure: Federal Agencies Provide Funding but Could Increase Coordination to Help Communities*, GAO-15-450T (Washington, D.C.: Feb. 27, 2015).

[2]Under the Safe Drinking Water Act, a community water system is a public water system that serves at least 15 service connections used by year-round residents of the area served by the system or that regularly serves at least 25 residents year-round. 42 U.S.C. § 300f(15).

[3]These estimates are based on data for active community water systems contained in EPA's SDWIS database for 2019, quarter 2.

[4]GAO conducted an assessment of current and developing technologies that could reduce water use and address water scarcity in the municipal water sector with a focus on medium and larger water systems serving more than 3,300 people. See GAO, *Technology Assessment: Municipal freshwater scarcity; Using technology to improve distribution system efficiency and tap nontraditional water sources*, GAO-16-474 (Washington, D.C.: Apr. 29, 2016).

[5]Under EPA's water technology and innovation blueprint document, technology innovation includes an array of approaches: the development and deployment of new technologies; new applications of existing technologies; production changes; and organizational, management and cultural changes that can improve the condition and sustainability of the nation's water resources. Environmental Protection Agency, *Blueprint for Integrating Technology Innovation into the National Water Program*, Version 1.0 (Washington, D.C.: Mar. 27, 2013).

drinking water technologies. For example, the Water Infrastructure Improvements for the Nation (WIIN) Act of 2016 requires EPA, in consultation with the U.S. Department of Agriculture (USDA), to develop a drinking water technology clearinghouse for information on the cost-effectiveness of innovative and alternative drinking water delivery systems, including wells and well systems, and disseminate this information to the public and to communities of 500 or fewer people.[6] Moreover, to support small communities' infrastructure needs, both EPA and USDA administer funding and technical assistance programs that help small communities develop drinking water systems and comply with the Safe Drinking Water Act.

The WIIN Act includes a provision for us to report on the use of innovative and alternative drinking water delivery systems serving 500 or fewer people, the range of cost savings for communities using such drinking water systems, and the use of drinking water technical assistance programs operated by EPA and USDA. For this review we refer to these systems as "alternative drinking water systems," which we define to mean possible options for water systems, including substitute systems (such as wells and well systems) or innovative systems featuring advanced methods identified by EPA, USDA, and others.[7] This report describes (1) what is known about the use of alternative drinking water systems serving 500 or fewer people; (2) what is known about the range of any cost savings to communities of 500 or fewer people using alternative drinking water systems; and (3) drinking water technical assistance programs administered by EPA and USDA and the types of assistance provided by these programs.

To describe what is known about the use of alternative drinking water systems by communities of 500 or fewer people and the range of any cost savings, we conducted a literature search and reviewed the SDWIS database, reports, and webpages from EPA, USDA, and others we interviewed with information on such systems. We interviewed EPA and USDA officials, representatives of two EPA-funded national research centers for small drinking water systems, and officials and representatives of 12 organizations that we and other interviewees identified for their relevant expertise or knowledge about the use of alternative drinking water systems in communities of 500 or fewer people and cost savings and primary cost drivers of such systems. To describe drinking water technical assistance programs administered by EPA and USDA and the types of assistance these programs provide, we reviewed EPA and USDA documents and webpages, and interviewed EPA and USDA officials about their technical assistance programs. We also obtained and analyzed EPA and USDA obligations data for these programs for fiscal years 2016 through 2018. We took a number of steps to assess the reliability of these data including reviewing related documentation and interviewing knowledgeable agency officials. We found these data to be sufficiently reliable for our purposes. Enclosure I presents a more detailed description of our objectives, scope, and methodology.

We conducted this performance audit from February 2019 to January 2020 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

[6]Specifically, the Administrator of EPA, in consultation with the Secretary of Agriculture, in addition to developing the technology clearinghouse for such information, is to disseminate such information to the public and to communities and not-for-profit organizations seeking federal funding for drinking water delivery systems serving 500 or fewer persons. Pub. L. No. 114-322, § 2108(a), 130 Stat. 1628, 1728 (2016) (codified at 42 U.S.C. § 300j-3d(a)).

[7]For the purposes of this report, we did not include water systems smaller than those covered under the Safe Drinking Water Act, i.e., those that do not have at least 15 service connections or regularly serve at least 25 individuals.

Results in Brief

We found limited information on the use of alternative drinking water systems serving communities of 500 or fewer people. For example, some limited information on treatment processes used by each public water system is available in EPA's SDWIS database. However, only one treatment process per system is required to be entered in the database, and multiple processes and technologies are commonly used in a single system.

We also found there is an unknown range of cost savings to communities of 500 or fewer people using alternative drinking water systems. The cost savings are case-specific and may vary widely depending on a number of factors, such as distance of the community from the location of a supplier for the transportation of goods or services or options of conventional systems that are available, such as hookup to a public water system.

Regarding technical assistance programs, EPA and USDA each administer two programs that award funds for various types of technical assistance and training to small drinking water systems serving communities of 10,000 or fewer people. In fiscal years 2016 through 2018, these agencies awarded funds totaling from $62.9 million to $96 million each year for technical assistance and training activities under these programs.

Background

Under the Safe Drinking Water Act, EPA is authorized to regulate contaminants in public water systems.[8] Among its responsibilities under the Safe Drinking Water Act, EPA establishes standards for public water systems which generally limit the levels of specific contaminants in drinking water that can adversely affect public health. States and tribes can seek lead enforcement responsibility (called primacy) for public water systems if they adopt drinking water regulations that are no less stringent than EPA's regulations and meet other statutory and regulatory requirements.[9]

The Safe Drinking Water Act covers public water systems, one type of which is community water systems.[10] Community water systems are those public water systems that serve at least 15 service connections used by year-round residents or regularly serve at least 25 year-round residents. Local governments, as well as private nonprofit or private-for-profit entities such as homeowner associations and mobile home parks, may own and operate community water systems. EPA requires states and tribes with primacy for overseeing public water systems to periodically enter violations and enforcement data about the public water systems, including community water systems, in their respective states into the SDWIS database. Inventory information on public water systems such as water source, population served, and public water system type is also collected in the SDWIS database. Collection and treatment processes used by a water system largely depend on the water source used. Most community water systems serving 500 or fewer people rely on groundwater as the water source, but some rely on surface

[8]Pub. L. No. 93-523 (1974) (codified as amended at 42 U.S.C. §§ 300f-300j-27).

[9]Most states and territories (except Wyoming and the District of Columbia) and the Navajo Nation have primacy. EPA implements the Safe Drinking Water Act in non-primacy areas and retains oversight of primacy states.

[10]Other types of public water systems are: (1) Non-Transient Non-Community Water Systems that regularly supply water to at least 25 of the same people at least 6 months per year such as schools, factories, office buildings, and hospitals, and (2) Transient Non-Community Water Systems that provide water in a place such as a gas station or campground where people do not remain for long periods of time.

water. Drinking water systems that rely on groundwater generally draw water from one or more wells. Depending on the quality of the groundwater, it may need to be disinfected, typically through a process involving treatment with chlorine, or may not need any treatment. In contrast, water systems that rely on surface water generally intake water from the surface water source and treat it through a series of processes at a centralized facility.[11] According to EPA officials, public water systems that rely on surface water are required to provide both disinfection and, with limited exceptions, filtration treatment.

Under the Safe Drinking Water Act, EPA works with its state and tribal partners to implement various technical and financial programs to ensure drinking water safety. In particular, through its Drinking Water State Revolving Fund program, EPA annually provides grants to states to help finance local drinking water projects, some of which go to small communities. States use this funding, along with a required 20 percent match, to capitalize their state revolving funds. The funds provide low-cost loans or other financial assistance for a wide range of water infrastructure projects, and a portion of the funds may be used for technical assistance activities. EPA also provides funds from the program to tribal nations throughout the United States for drinking water projects. In addition, EPA administers a separate program to fund nonprofit organizations to provide small systems with training and technical assistance activities related to drinking water, among other things.

To help advance innovation and technology in the drinking water sector, EPA's Office of Research and Development manages projects and activities to support research on drinking water technologies for use by small communities, including tribal communities, and state primacy agencies.

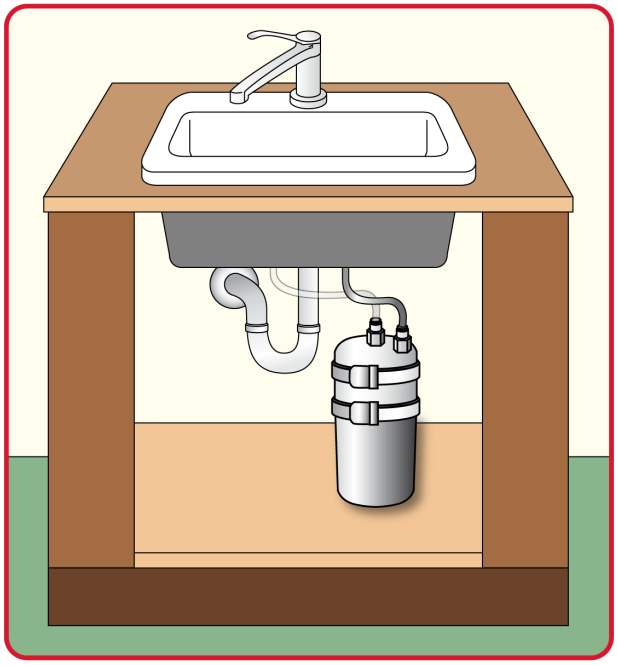
USDA also has programs that provide funding and technical assistance for drinking water projects in communities with 10,000 or fewer people.

Limited Information Is Available on Use of Alternative Drinking Water Systems Serving Communities of 500 or Fewer People

We found limited information on the use of alternative drinking water systems serving communities of 500 or fewer people. Some limited information is available in EPA's SDWIS database, such as information on treatment processes used by public water systems, including those serving communities of 500 or fewer people. In SDWIS, primacy agencies identify treatment processes used by public water systems by checking listed options. If a treatment process used by a public water system is not among the listed options, the primacy agency may identify it as an "innovative" process with a note describing the treatment process. Of the 26,995 community water systems with populations of 500 or fewer people, the SDWIS database identifies more than 1,500 systems using "innovative" treatment processes out. In the notes for these systems, primacy agencies have identified a wide range of technologies used to treat the public water supply for various contaminants. For example, four states included notes regarding point-of-use devices used by systems serving 500 or fewer people. Point-of-use devices are an alternative option to centralized treatment that are used to remove radionuclides, arsenic, or other inorganic contaminants regulated in public water systems. Such a system involves the installation of filters in each home or building to treat only water intended for direct consumption (drinking and cooking) typically at a point where water will be used, such as at the kitchen sink (See fig. 1).

[11]According to EPA documents, conventional treatment for surface water typically consists of: coagulation, flocculation, clarification, and filtration, followed by disinfection at full-scale.

Figure 1: Illustration of Point-of-Use Treatment Devices



Point-of-use treatment devices are filters for removing contaminants in drinking water. These devices are installed at the connection point where the drinking water will be used, such as under a kitchen sink.

Changing the filter is a part of maintenance of a point-of-use treatment device.

Source: GAO. | GAO-20-217R

According to EPA officials, EPA requires primacy agencies to enter information on at least one treatment process for each public water system. However, multiple processes and technologies are commonly used in a single system, and EPA does not require primacy agencies to identify all treatment processes and technologies in the database. For these reasons, SDWIS information on the use of innovative treatment processes by community water systems serving 500 or fewer people is not complete.

In addition to the SDWIS information, we identified a study on drinking water technologies for small systems that provides some information on the use of alternative drinking water systems by communities of 10,000 or fewer people.[12] This study included a survey of states' experiences with new technologies and barriers for technology approvals for small systems.[13] In particular, the study surveyed states on whether they have evaluated or approved the use of 14 "new and innovative technologies" at least once.[14] The technologies most commonly approved by states were low-pressure membranes and high-pressure membranes.[15] These are filtration processes

[12]D. T. Ringenberg, S. D. Wilson and B. I. Dvorak, "State Barriers to Approval of Drinking Water Technologies for Small Systems," *Journal American Water Works Association*, vol. 109, no. 8 (August 2017): pp. E343-E352.

[13]The survey was sent to 49 state agencies, with 40 responding (82 percent response rate) by answering some or all questions.

[14]The list of 14 "new and innovative technologies" consists of technologies and methods not considered to be frequently applied in a majority of the states. The list was compiled by a workgroup of the two EPA-funded small systems research centers and the Association of State Drinking Water Administrators. See Ringenberg, Wilson, and Dvorak, "State Barriers to Approval," p. E344-345.

[15]The number of states that provided an answer for each of the technologies varied from 34 to 37 out of a total of 40 state respondents.

used to remove suspended particles and microorganisms. The technologies least frequently approved were ultraviolet light-emitting lamps used to inactivate microorganisms, and ferrate oxidation which involves the use of a dry, iron-based chemical for drinking water treatment. Among other things, authors of the study concluded that some of the technologies are more commonly used than previously realized. The study does not report the extent to which these technologies may be used in communities of 500 or fewer. However, in our review of related information in SDWIS, we identified a few technologies including low-pressure membranes that are being used by systems serving communities of this population range. In addition, the authors of the study noted that state regulators listed a number of concerns for small systems in considering the use of new technologies, including that new technologies are too costly and too risky for small systems. Respondents were also asked to identify the barriers to acceptance of new technologies. Barriers respondents most commonly cited were: staff time for review and approval, limited staff to run the program, lack of training of staff for adequate evaluation, and lack of information from vendors.

Several EPA webpages also provide some information on the use of alternative drinking water systems.[16] In particular, one webpage includes a link to a training webinar on tribal and very small systems that discusses alternative technologies piloted or used by communities of 500 or fewer people. Other EPA webpages we reviewed discuss alternative systems that may be applicable for use by very small communities. These include one webpage focused on new technologies piloted by communities of 10,000 of fewer people to remove specific contaminants such as ammonia, arsenic or fluoride—but this webpage does not specifically describe piloting these technologies in communities with a population of fewer than 500 people.

Table 1 provides examples of alternative drinking water systems used by communities of 500 or fewer people that we identified based on these documentary sources and interviews with EPA and USDA officials and others.

Table 1: Examples of Alternative Drinking Water Systems Used by Communities of 500 or Fewer People

Technology or method	Description
Biosand filtration	A sand filtration process used to remove bacteria
Low-pressure microfiltration or ultrafiltration membrane	A physical filtration process used to remove suspended particles and microorganisms
Point-of-entry treatment	Device installed at the water entry point to treat all water as soon as it enters each home or building in a water system
Point-of-use treatment	Device installed at a single water tap, such as a kitchen faucet, for treatment of water primarily used for drinking and cooking in each home or building
Ultraviolet disinfection	Ultraviolet light emitting lamps used to inactivate microorganisms

Source: GAO analysis of literature search results, Environmental Protection Agency's (EPA) Safe Drinking Water Information System, webpages, and interviews with EPA and Department of Agriculture officials and others. | GAO-20-217R

In addition, EPA webpages and reports we reviewed and officials and representatives from EPA, USDA and two of 12 organizations we interviewed identified the use of small communities'

[16]Environmental Protection Agency ,Ground Water and Drinking Water, Drinking Water Technologies webpage, accessed June 3, 2019, https://www.epa.gov/ground-water-and-drinking-water/drinking-water-technologies, and Environmental Protection Agency, Small Drinking Water Systems Research webpage, accessed October 24, 2019, https://www.epa.gov/water-research/small-drinking-water-systems-research.

partnerships as an alternative organizational approach for improving operations and management of any type of system—conventional or innovative. For example, two EPA reports provide information on partnership arrangements ranging in formality including noncontractual partnerships to share equipment and purchase supplies in bulk, among other things.[17] Both reports also discuss partnership arrangements such as regional water systems created by several independent systems for the purpose of sharing, for example, system management, operators, or source water.

The Range of Cost Savings to Communities of 500 or Fewer People Using Alternative Drinking Water Systems Is Unknown

In our literature search and interviews, we did not identify studies or other information on the range of cost savings for communities of 500 or fewer people using alternative drinking water systems. We did, however, identify limited information on the costs of alternative systems. In addition, we found that costs and cost savings of alternative drinking water systems are case-specific.

Regarding costs of alternative drinking water systems, EPA's clearinghouse webpage includes links to models and guidance documents to evaluate the costs of different types of systems, including point-of-use systems, reverse osmosis, nanofiltration, and nontreatment options, such as connecting to a nearby drinking water system or drilling a new well to replace a contaminated well.[18] The models were developed to assist EPA in estimating national compliance costs, but they may also be used to estimate the costs of various system types for specific cases by entering pertinent system-specific data such as design and average flows, target contaminants, and raw water quality. According to EPA officials, models are best utilized by knowledgeable engineers. In addition, guidance documents are available for estimating costs related to installation of point-of-entry and point-of-use systems. These documents include additional information on regulatory requirements, technology options and considerations, and program elements and considerations and sample documents to assist with using point-of-use and point-of-entry approaches (e.g., model ordinance language and access agreements, sample monitoring and maintenance logs, and sample public education flyers).

Based on our review of EPA's cost models and according to interviews we conducted,[19] costs and cost savings of alternative drinking water systems are case-specific and may vary widely, depending on several factors. For example, the distance of a community from a supplier's location may affect the cost of transporting chemicals used for treatment by a system. In addition, if a system uses electricity, the costs for electricity will vary by location and will depend on whether the electricity is generated onsite or purchased. Also, cost savings to a community that uses an alternative drinking water system will depend on the conventional option available. For example, if the conventional option is to hook up to an existing water system, the distance of

[17]Environmental Protection Agency, *Restructuring Small Drinking Water Systems: Options and Case Studies*,(October 2013), and ; *Restructuring and Consolidation of Small Drinking Water Systems: A Compendium of State Authorities, Statues, and Regulations*, EPA 816-B-07-001(October 2007).

[18]Reverse osmosis and nanofiltration are physical separation technologies that remove contaminants from water. Pressure is applied to water, forcing it through a semipermeable membrane, emerging as purified water and leaving behind dissolved solids. Reverse osmosis membranes can remove smaller particles (0.1 nanometers) than nanofiltration (0.002 micrometers).

[19]These included interviews with officials and representatives from EPA, USDA, two national research centers for small drinking water systems, and five of 12 organizations.

the community from the system will dictate the amount of materials and equipment needed, such as the length of pipe required, to use that option. Some officials and representatives we interviewed also described how geology and climate influence the water quality and the treatment technologies that may be used. In some cases, such as in Alaska where cold climate conditions and permafrost present challenges for drilling groundwater wells in some areas, options for safe drinking water may be very limited. Consequently, many communities located in such areas in Alaska rely on surface water sources that require additional treatment steps compared to groundwater. In addition, water may need to be piped above ground with constant water circulation through loops with heat exchanges to prevent freezing, which is costly. A representative of one of the 12 organizations we interviewed said it is difficult to determine a range of cost savings for a particular alternative technology nationwide because of regional differences, including for goods or services needed for both standard and alternative systems.

Both EPA and USDA Administer Programs That Provide Drinking Water Technical Assistance for Small Systems Serving Communities of 10,000 or Fewer People

EPA and USDA administer four programs that award funds for various types of technical assistance and training to small drinking water systems serving communities of 10,000 or fewer people. In fiscal years 2016 through 2018, EPA and USDA awarded funds totaling from $62.9 million to $96 million per year for technical assistance and training activities under these four programs, as shown in table 2.[20]

Table 2: Funds Awarded under Environmental Protection Agency (EPA) and U.S. Department of Agriculture (USDA) Programs that Support Drinking Water Technical Assistance and Training to Communities of 10,000 or Fewer People in Fiscal Years 2016 through 2018

Dollars in millions

	Amount of funds awarded by fiscal year		
Program	**2016**	**2017**	**2018**
EPA Training and Technical Assistance for Small Systems	12.7	12.7	25.4[a]
EPA Small System Technical Assistance Drinking Water State Revolving Fund Set-Aside	14.0	13.8	14.0
USDA Circuit Rider Program	16.1	16.4	16.4
USDA Technical Assistance and Training Program	20.1	20.1	40.2

Source: GAO analysis of EPA and USDA program obligations data. | GAO-20-217R

[a]In fiscal year 2018, EPA awarded funds to cover program activities for 2 consecutive fiscal years at $12.7 million each year. Funds awarded in fiscal years 2016 and 2017 are for program activities in a single fiscal year.

Each program is described below:

- **EPA Training and Technical Assistance for Small Systems.** Under this program, EPA competitively awards grants to nongovernmental organizations for training and technical assistance to public water systems, among others, serving 10,000 or fewer people, in specified areas. In fiscal years 2016 through 2018, EPA awarded about $12.7 million in

[20]Funds awarded refers to obligations data we reviewed under each of following programs: EPA's Training and Technical Assistance for Small Systems program; EPA's Small System Technical Assistance Drinking Water State Revolving Fund set-aside program; USDA's Circuit Rider program; and USDA's Technical Assistance and Training program.

annual grants per year for assistance in four areas: (1) about $8 million to help small systems comply with the Safe Drinking Water Act; (2) about $1.8 million to help small systems improve managerial and financial capacity; (3) about $1.7 million for private well owner training and assistance; and (4) about $1.2 million for onsite, decentralized wastewater systems operations and management assistance to improve water quality. According to grantee reports available as of May 2019, training related activities funded under the program included classroom training, webinars, video production and social media campaigns on topics such as Safe Drinking Water Act monitoring and sampling rules, drinking water risk communication, and private well owner education. Grantees also reported providing on-site technical assistance to small tribal and nontribal communities and private well owners nationwide. For instance, grantees reported assisting communities with technical operations such as asset management planning, leveraging funding to make system improvements that will increase compliance, and conducting private well assessments for residents.

- **EPA Small System Technical Assistance Drinking Water State Revolving Fund Set-Aside.** States are allowed to use up to 2 percent of their annual capitalization grant awards from the Drinking Water State Revolving Fund to support technical assistance to drinking water systems serving communities of 10,000 or fewer people in their respective states. Under the set-aside program, states provide technical assistance to help small systems build the capacity they need to provide safe drinking water, including assistance addressing compliance issues or planning new infrastructure projects, as well as specialized small system training. States may provide technical assistance through state program employees or third-party contractors. In fiscal years 2016 through 2018, states reported they allocated from $13.8 million to $14.0 million per year, or between 1.7 and 1.8 percent of their grant awards for this set-aside program. A 2017 EPA report highlighted activities funded through the small systems set-aside program, including development of an asset management spreadsheet tailored for water systems serving 1,000 or fewer people in Minnesota and a partnership with academic institutions to help recruit and improve skills of water system operators in Tennessee.[21]

- **USDA Circuit Rider Program.** Under this USDA program, small drinking water systems serving 10,000 or fewer people receive on-site technical assistance to address specific issues or build capacity. The assistance is provided by “circuit riders”—experienced water professionals—through a contracted nongovernmental organization. In addition to providing assistance with day-to-day operations and financial and management issues, circuit riders respond to natural disasters and emergencies as needed. The Circuit Rider program allows single technicians across the states and Puerto Rico to provide technical expertise to multiple small communities to support their water infrastructure needs, including when a system may be unable to afford a full-time technician on its own. Contracts are competitively awarded every 5 years. In fiscal years 2016 through 2018, USDA awarded over $16 million annually to the National Rural Water Association, the nongovernmental organization selected to administer the Circuit Rider program in the United States and Puerto Rico during that period. According to the final fiscal year 2018 contractor’s report, circuit riders reported providing communities with various types of on-site assistance. Assistance activities included compliance assistance (e.g., help with meeting monitoring and sampling requirements); assistance with operations and maintenance, such as locating and repairing

[21]Environmental Protection Agency, Office of Water, *Analysis of the Use of Drinking Water State Revolving Fund Set-Asides: Building the Capacity of Drinking Water Systems,* EPA 816-R-17-004 (Washington, D.C.: October 2017).

leaks or help with replacing broken equipment; assistance with management and finance issues (e.g., conducting water rate studies); and training for utility board members.

- **USDA Technical Assistance and Training Program.** Under this program, USDA awards grants to qualified state-based, regional, and national organizations to provide assistance and training to tribal and nontribal communities of 10,000 or fewer people for their drinking water and wastewater systems, and to support solid waste management in small communities. In fiscal years 2016 and 2017, USDA awarded more than $20 million each year to 20 and 22 nongovernmental organizations with relevant expertise, respectively. In fiscal year 2018, with increased appropriations for the program, USDA awarded more than $40 million to 30 nongovernmental organizations. Most grant awards included assistance to small communities on drinking water issues. For example, 25 of 30 grants USDA awarded in fiscal year 2018 supported assistance or training for small drinking water systems. Grantees reported providing assistance in areas such as budgeting and rate setting to improve managerial and financial capacity and identifying and evaluating solutions to water operational problems or processes. Some organizations also reported conducting localized events or activities. For instance, one organization conducted a summit meeting of tribal utility personnel from across the United States to facilitate peer-to-peer networking, information exchange, and collaboration as well as to provide training and operation certification testing.

Agency Comments

We provided a draft of this report to EPA and USDA for comment. Both EPA and USDA provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to the appropriate congressional committees, the Administrator of the Environmental Protection Agency, the Secretary of Agriculture, and other interested parties. In addition, the report is available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or gomezj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are Barbara Patterson (Assistant Director), Swati Thomas (Analyst in Charge), Colleen Candrl, Philip Farah, Cindy Gilbert, Charlotte E. Hinkle, Nacole King, Patricia Moye, Cynthia Norris, Danny Royer, and Melissa Wolf.

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Enclosures – 1

List of Committees

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United States Senate

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The Honorable Frank Pallone, Jr.
Chairman
The Honorable Greg Walden
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House of Representatives

Enclosure I: Objectives, Scope and Methodology

This report describes (1) what is known about the use of alternative drinking water systems serving 500 or fewer people; (2) what is known about the range of cost savings, if any, to communities of 500 or fewer people using alternative drinking water systems; and (3) drinking water technical assistance programs administered by the Environmental Protection Agency (EPA) and U.S. Department of Agriculture (USDA) and the types of assistance provided by these programs.

To describe what is known about the use of alternative drinking water systems by communities of 500 or fewer people and the range of cost savings, if any, we conducted a literature search and reviewed the Safe Drinking Water Information System (SDWIS) database, reports and webpages from EPA, USDA, and others with information on such systems. For the purposes of this report, we defined "alternative drinking water systems" to mean possible options for systems, including substitute systems (such as wells and well systems) or innovative systems featuring advanced methods identified by EPA, USDA, and others. As part of our literature search, we conducted searches of various databases to identify existing studies from peer-reviewed journals, conferences, industry or trade publications, and association or nonprofit publications. We searched databases such as Scopus, ProQuest, and SciTech Premium published from 2008 onward. Search terms we used included: alternative, new, innovative, drinking water, small, 500 or fewer, well water, and United States as well as cost, benefit, budget, and expense. In addition, we identified relevant studies and reports through review of article references, review of webpages, and interviews we conducted. We limited the studies and reports we reviewed to those that discussed alternative drinking water systems or technologies used or piloted in communities of 500 or fewer people. From these sources, we identified 14 studies and reports that met these criteria. To assess the reliability of SDWIS data on population served, we reviewed related documentation, interviewed knowledgeable agency officials, and conducted manual data testing for missing data and outliers, We found the data on the number of community water systems that serve populations of 500 or fewer people to be sufficiently reliable for our purposes. However, we found that data fields related to the treatment processes that community water systems were using were incomplete and therefore not sufficiently reliable for purposes of reporting on the use of alternative drinking water systems by communities of 500 or fewer people.

We interviewed EPA and USDA officials, and representatives of two EPA-funded national research centers for small drinking water systems to help identify examples of alternative drinking water systems and those used in communities of 500 or fewer people, as well as to obtain information on the costs of such systems.[22] In addition, we interviewed officials and representatives of 12 organizations that we and other interviewees identified, such as the Indian Health Service and nongovernmental organizations that assist small systems, for their relevant expertise or knowledge about use of alternative drinking water systems by communities of 500

[22]EPA funds extramural research through Science to Achieve Results (STAR) grants to complement and expand its intramural research program by providing engagement between the agency and the nation's leading scientists and engineers. In 2014, EPA awarded STAR grants of about $8.2 million to the Design of Risk-reducing, Innovative-implementable Small-system Knowledge (DeRISK) Center at University of Colorado-Boulder and the Water Innovation Network for Sustainable Small Systems (WINSSS) Center at the University of Massachusetts-Amherst. The centers were awarded funding to conduct research and develop and demonstrate innovative and sustainable technologies and approaches to improve the sustainability of small systems.

or fewer persons and to obtain information on costs, cost savings, and primary cost drivers of various alternative systems.[23]

To describe drinking water technical assistance programs administered by EPA and USDA and the types of assistance these programs provide, we reviewed EPA and USDA documents and webpages as of May 2019 or earlier. We also interviewed officials from these two agencies to identify and gather information on the relevant drinking water technical assistance programs. We obtained and analyzed EPA and USDA obligations data for these programs for fiscal years 2016 through 2018 from EPA's Integrated Grants Management System, EPA's Drinking Water State Revolving Fund National Information Management System, USDA's Commercial Programs Application Processing System and USDA's Program Funds Control System. We assessed the reliability of the obligations data by reviewing documentation on corresponding grant programs, reviewing individual grant awards and contracts, and interviewing knowledgeable agency officials. In addition, USDA officials reviewed and verified obligations data for the more than 70 grants the agency awarded in fiscal years 2016 through 2018 under its Technical Assistance and Training Program. We found these data to be sufficiently reliable for our purposes.

We conducted this performance audit from February 2019 to January 2020 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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[23]Specifically, we interviewed officials and representatives from the following agencies and organizations: Alaska Department of Environmental Conservation Division of Water, Alaska Native Tribal Health Consortium, American Water Works Association, Association of State Drinking Water Administrators, Community Engineering Corps, Illinois State Water Survey of the University of Illinois, Indian Health Service, National Groundwater Association, National Rural Water Association, Rural Community Assistance Partnership, College of Engineering and Physical Sciences at the University of New Hampshire, and the Water Systems Council.

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