



July 2018

K-12 EDUCATION

Lead Testing of School Drinking Water Would Benefit from Improved Federal Guidance

Why GAO Did This Study

No federal law requires testing of drinking water for lead in schools that receive water from public water systems, although these systems are regulated by the EPA. Lead can leach into water from plumbing materials inside a school. The discovery of toxic levels of lead in water in Flint, Michigan, in 2015 has renewed awareness about the danger lead exposure poses to public health, especially for children.

GAO was asked to review school practices for lead testing and remediation. This report examines the extent to which (1) school districts are testing for, finding, and remediating lead in drinking water; (2) states are supporting these efforts; and (3) federal agencies are supporting state and school district efforts. GAO administered a web-based survey to a stratified, random sample of 549 school districts, the results of which are generalizable to all school districts. GAO visited or interviewed officials with 17 school districts with experience in lead testing, spread among 5 states, selected for geographic variation. GAO also interviewed federal and state officials and reviewed relevant laws and documents.

What GAO Recommends

GAO is making seven recommendations, including that EPA update its guidance on how schools should determine lead levels requiring action and for EPA and Education to collaborate to further disseminate guidance and encourage testing for lead. EPA and Education agreed with the recommendations.

View [GAO-18-382](#). For more information, contact Jacqueline M. Nowicki at (617) 788-0580 or nowickij@gao.gov or J. Alfredo Gomez at (202) 512-3841 or gomezj@gao.gov.

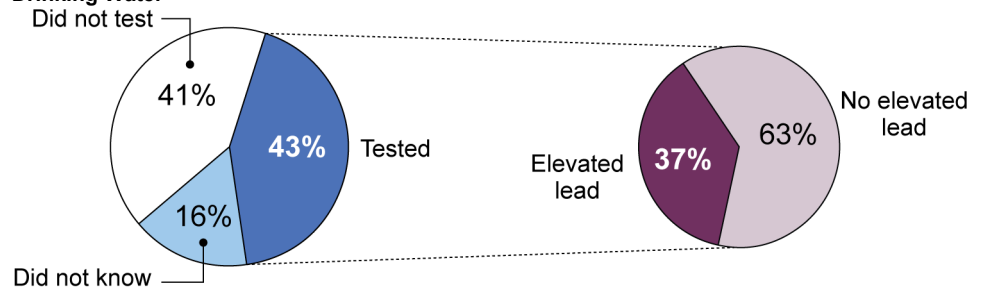
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What GAO Found

An estimated 43 percent of school districts, serving 35 million students, tested for lead in school drinking water in 2016 or 2017, according to GAO's nationwide survey of school districts. An estimated 41 percent of school districts, serving 12 million students, had not tested for lead. GAO's survey showed that, among school districts that did test, an estimated 37 percent found elevated lead (lead at levels above their selected threshold for taking remedial action.) (See figure.) All school districts that found elevated lead in drinking water reported taking steps to reduce or eliminate exposure to lead, including replacing water fountains, installing filters or new fixtures, or providing bottled water.

Estimated Percentage of Public School Districts Reporting Lead Testing and Results for Drinking Water



Source: GAO survey of public school districts. | GAO-18-382

Note: GAO's survey was administered from July to October 2017 and asked school districts to report information based on the 12 months prior to their completing the survey. Testing estimates have a plus or minus 7 percent margin of error; elevated lead estimates have a plus or minus 10 percent margin of error at a 95 percent confidence level. Elevated lead refers to levels of lead above the school district's threshold for taking remedial action.

According to the Environmental Protection Agency (EPA), at least 8 states have requirements that schools test for lead in drinking water as of 2017, and at least 13 additional states supported school districts' voluntary efforts with funding or in-kind support for testing and remediation. In addition, the five states GAO visited provided examples of technical assistance to support testing in schools.

EPA provides guidance and other resources to states and school districts regarding testing and remediating lead in drinking water, and the Department of Education (Education) provides some of this information on its websites. School district officials that used EPA's written guidance said they generally found it helpful. Although EPA guidance emphasizes the importance of addressing elevated lead levels, GAO found that some aspects of the guidance, such as the threshold for taking remedial action, were potentially misleading and unclear, which can put school districts at risk of making uninformed decisions. In addition, many school districts reported a lack of familiarity with EPA's guidance, and their familiarity varied by region of the country. Education and EPA do not regularly collaborate to support state and school district efforts on lead in drinking water, despite agreeing to do so in a 2005 memorandum of understanding. Such collaboration could encourage testing and ensure that more school districts will have the necessary information to limit student and staff exposure to lead.

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Abbreviations

3Ts guidance	3Ts for Reducing Lead in Drinking Water in Schools
CDC	Centers for Disease Control and Prevention
Education	U.S. Department of Education
EPA	Environmental Protection Agency
FRPL	free or reduced-price lunch
K-12	Kindergarten through 12th grade
LCR	Lead and Copper Rule
NCES	National Center for Education Statistics
SDWA	Safe Drinking Water Act

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July 5, 2018

Congressional Requesters

The discovery of toxic levels of lead in drinking water in Flint, Michigan in 2015 has renewed awareness about the risks that lead poses to public health.¹ Exposure to lead can result in elevated blood lead levels and negative health effects. Children are at particular risk, because their growing bodies absorb more lead than adults, so protecting them from lead is important to lifelong good health. According to the Centers for Disease Control and Prevention (CDC), elevated blood lead levels have been linked to anemia, kidney and brain damage, learning disabilities, and decreased growth. As a result of widespread human use, lead is prevalent in the environment; for example, it can be found in paint and soil, and can leach into drinking water from lead-containing plumbing materials, such as faucets and drinking fountains.²

Lead in school drinking water is a concern because it is a daily source of water for over 50 million children enrolled in public schools. The pattern of school schedules—including time off over weekends, holidays, and extended breaks—can contribute to standing water in the school’s plumbing system. If there is lead in the plumbing system, the potential for it to leach into water can increase the longer the water remains in contact with the plumbing. Other factors also influence the extent to which lead enters the water, such as the chemistry of the water, the amount of lead that comes into contact with the water, and the presence of protective scales or coatings inside plumbing materials.³

¹The events in Flint, Michigan, were not the first time in recent history that drinking water contaminated with toxic levels of lead prompted questions about the nationwide scope of the problem. For example, in 2003, testing in the District of Columbia revealed that more than 4,000 households in the city had elevated levels of lead in their drinking water.

²According to CDC, lead-based paint hazards, such as dust containing lead and chips from deteriorated lead paint, are the most common high dose source of lead exposure for U.S. children. Lead-based paint hazards are outside the scope of this review.

³According to EPA, a variety of complex issues contribute to the occurrence and rate of corrosion: the interactions between water velocity, temperature, alkalinity, chlorine levels, the age and condition of plumbing, and the amount of time water is in contact with plumbing, as well as other chemical, physical, and biological factors.

While there is no federal law requiring testing of drinking water for lead in schools that receive water from public water systems, these water systems themselves are regulated by the Environmental Protection Agency (EPA) under the Lead and Copper Rule (LCR), as required by the Safe Drinking Water Act (SDWA).⁴ Because the LCR regulates public water systems, it does not directly address individual schools that are served by a public water system. The federal government—including EPA, the Department of Education (Education), and CDC—has a limited role in addressing lead in school drinking water.⁵ These agencies, along with other organizations, signed a memorandum of understanding in 2005 encouraging lead testing and remediation in schools, and they provide information and guidance to stakeholders, such as state officials and school districts. Several states and school districts have taken steps to test for lead in school drinking water. States and school districts that choose to test generally set their own threshold, or “action level,” of lead found in drinking water that requires action, such as replacing a water fountain or installing a filter. We use the term elevated lead in this report to mean lead at levels above a selected action level.

You asked us to study the testing and remediation practices used to protect children from lead. This report builds upon a separate 2017 review that addresses schools with their own water source that are therefore subject to federal requirements for lead testing and remediation under the LCR.⁶ In this review, our objectives were to examine (1) the extent to which school districts are testing for, finding, and remediating lead in school drinking water; (2) the extent to which states require or support testing for and remediating lead in school drinking water by school

⁴Pub. L. No. 93-523, 88 Stat. 1660 (1974). Under the Safe Drinking Water Act, EPA is authorized to regulate contaminants in public drinking water systems. Since 1974, EPA has implemented its drinking water program under three separate legislative frameworks—first under the initial statute and subsequently under major amendments in 1986 and 1996.

⁵According to EPA, approximately 7,000 schools have their own water supply (such as a well) and are regulated under the LCR. The LCR generally requires water systems to minimize lead in drinking water by controlling the corrosion of metals in the infrastructure they use to deliver water and in household plumbing. The LCR also includes requirements to minimize copper in drinking water. This report examines only the requirements applicable to lead. See also GAO, *Drinking Water: Additional Data and Statistical Analysis May Enhance EPA's Oversight of the Lead and Copper Rule*, [GAO-17-424](#) (Washington, D.C.: Sept. 1, 2017).

⁶ [GAO-17-424](#).

districts; and (3) the extent to which federal agencies are supporting state and school district efforts to test for and remediate lead.

To address our first objective, we drew a stratified, random sample of 549 school districts, administered a web-based survey from July to October 2017 asking whether they had tested for, found, or remediated lead in the past 12 months, and achieved a 68 percent response rate. Based on the design and response rate, estimates generated from these survey results are generalizable to the population of public school districts. We also conducted site visits to or interviewed officials with 17 school districts with experience testing for lead in drinking water and selected to vary in population density. These districts were located in five states—Georgia, Illinois, Massachusetts, Oregon, and Texas—which were selected to vary in geographic location and because they varied in the extent to which they required school-based lead testing and remediation. To address our second and third objectives, we used site visit information, requested information about state requirements from selected state officials, and interviewed officials in EPA’s headquarters and in all 10 regional offices, and at Education and CDC. We reviewed relevant documents, such as the 2005 memorandum of understanding and EPA guidance, as well as relevant federal and state laws and regulations. For the states with testing requirements, we reviewed relevant laws, regulations and policy documents and confirmed our understanding of state testing requirements with state officials. We provided the information about state requirements to appropriate state officials for their review and confirmation. We evaluated federal efforts to support lead testing and remediation in schools against the actions prescribed in the memorandum and federal standards for internal control, which call for agencies to provide effective communication to external parties, among other things. Appendix I contains a more detailed description of our objectives, scope, and methodology.

We conducted this performance audit from October 2016 to July 2018 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.

Background

Elementary and Secondary Education School Facilities

According to Education, 50.3 million students were enrolled in more than 98,000 public elementary and secondary schools nationwide in the 2014-2015 school year.⁷ These individual public schools are overseen by approximately 16,000 local educational agencies (referred to in this report as school districts) which are, in turn, overseen and supported by state educational agencies. School districts can range in size from one school (for example, in rural areas) to hundreds of schools in large urban and suburban areas. For example, the 100 largest districts in the United States together have approximately 16,000 schools and enroll about 11 million students. In addition, charter schools are public schools created to achieve a number of goals, such as encouraging innovation in public education. Oversight of charter schools can vary, with some states establishing charter schools as their own school district and other states allowing charter schools to be either a distinct school district in themselves or part of a larger district. Charter schools are often responsible for their own facilities; these may be located in non-traditional school buildings, and may lease part or all of their space.

Typically, state educational agencies are responsible for administering state and federal education laws, disbursing state and federal funds, and providing guidance to school districts and schools across the state. State educational agencies frequently provide funds for capital improvements to school facilities, which school districts may use to address issues related to lead in school drinking water, among other things.⁸ Different state agencies, including agencies for education, health, and environmental protection, may provide school districts with guidance on testing and remediation of lead in school drinking water. Within a school district, responsibility for water management may be held by individuals in

⁷M. Glander, Selected Statistics from the Public Elementary and Secondary Education Universe: School Year 2014–15 (NCES 2016-076), prepared for the U.S. Department of Education, Washington, D.C.: National Center for Education Statistics, 2016, retrieved October 4, 2017 from <http://nces.ed.gov/pubsearch>. We used 2014-2015 data from the National Center for Education Statistics to create our survey of school districts, and include the same data here for consistency. Data from the 2015-2016 school year are similar. Unless otherwise noted, our review was focused on public schools.

⁸In school year 2013-2014, school districts received 46 percent of their funding from state sources, 45 percent from local sources, and 9 percent from federal sources.

different positions, such as facilities managers or environmental specialists.

Health Effects of Lead

Lead is a neurotoxin that can accumulate in the body over time with long-lasting effects, particularly for children. According to the CDC, lead in drinking water can cause health effects if it enters the bloodstream and causes an elevated blood lead level. Lead in a child's body can slow down growth and development, damage hearing and speech, and lead to learning disabilities. For adults, lead can have detrimental effects on cardiovascular, renal, and reproductive systems and can prompt memory loss. In pregnant women, lead stored in bones (due to lead exposure prior to and during pregnancy) can be released as maternal calcium used to form the bones of the fetus, reduce fetal growth, and increase risk of miscarriage and stillbirth. The presence of lead in the bloodstream can disappear relatively quickly, but bones can retain the toxin for decades. Lead in bones may be released into the blood, re-exposing organ systems long after the original exposure. The concentration of lead, total amount consumed, and duration of exposure influence the severity of health effects. The health consequences of lead exposure can differ from person to person and are affected by the cumulative dose of lead and the vulnerability of the individual person regardless of whether the lead exposure is from food, water, soil, dust, or air. Although there are medical therapies to remove lead from the body, they cannot undo the damage it has already caused. For these reasons, EPA, CDC, and others recommend the prevention of lead exposure to the extent possible, recognizing that lead is widespread in the environment.

The Safe Drinking Water Act

The SDWA authorizes EPA to set standards for drinking water contaminants in public water systems. For a given contaminant the act requires EPA to first establish a maximum contaminant level goal, which is the level at which no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety. EPA must then set an enforceable maximum contaminant level as close to the maximum contaminant level goal as is feasible, or require water systems to use a treatment technique to prevent known or anticipated adverse effects on the health of persons to the extent feasible. Feasible means the level is achievable using the best available technology or treatment technique.

In 1991 EPA issued the LCR, which it revised in 2000 and 2007, establishing regulations for water systems covered by the SDWA. Lead

concentration in water is typically measured in micrograms of lead per liter of water (also referred to as “parts per billion” or ppb).⁹ The rule established a maximum contaminant level goal of zero, because EPA concluded that there was no established safe level of lead exposure. EPA decided not to establish an enforceable maximum contaminant level, concluding that any level reasonably close to the goal would result in widespread noncompliance, and therefore was not feasible. Instead, the rule established an “action level” of 15 micrograms of lead per liter (15 ppb) in a one liter sample of tap water, a level that EPA believed was generally representative of what could be feasibly achieved at the tap.¹⁰ The action level is a screening tool for determining when certain follow-up actions are needed, which may include corrosion control treatment, public education, and lead service line replacement. Sample results that exceed the lead action level do not by themselves constitute violations of the rule. If the lead action level is exceeded in more than 10 percent of tap water samples collected during any monitoring period (that is, if the 90th percentile level is greater than the action level), a water system must take actions to reduce exposure.¹¹

Several amendments to the SDWA are relevant to testing for lead in school drinking water. In 1988, the SDWA was amended by the Lead Contamination Control Act (LCCA), which banned the manufacture and sale of drinking water coolers with lead-lined tanks containing more than 8 percent lead; the statute defined a drinking water cooler as containing 8 percent lead or less as “lead-free.”¹² The LCCA also required states to establish testing and remediation programs for schools.¹³ However, in 1996 a federal circuit court held that this requirement was

⁹Fewer parts per billion means there is less lead concentrated in the water.

¹⁰The LCR in 40 CFR 141.80(c)(2) refers to the action level in decimal form as 0.015 milligrams per liter; for simplicity, we refer to it as 15 micrograms per liter.

¹¹Samples are required to be taken from the highest risk sampling locations which according to the LCR include single-family homes or buildings with lead pipes, served by lead service lines, or copper pipes with lead solder installed after 1982.

¹²Pub. L. No. 100-572, § 2(a), 102 Stat. 2884 (1988).

¹³*Id.*, 102 Stat. 2886 (1988).

unconstitutional.¹⁴ In 2011, Congress passed the Reduction of Lead in Drinking Water Act, which amended the SDWA by lowering the maximum allowable lead content in “lead-free” plumbing materials such as pipes.¹⁵ This provision became effective on January 4, 2014. In 2016, Congress passed the Water Infrastructure Improvements for the Nation Act which, among other things, amended the SDWA, to establish a grant program for states to assist school districts in voluntary testing for lead contamination in drinking water at schools. As a condition of receiving funds, school districts are required to test for lead using standards that are at least as stringent as those in federal guidance for schools.¹⁶ In March 2018, Congress appropriated \$20 million to EPA for this grant program.

Lead in School Drinking Water

Lead can enter drinking water when service lines or plumbing fixtures that contain lead corrode, especially where the water has high acidity or low mineral content. According to EPA, lead typically enters school drinking water as a result of interaction with lead-containing plumbing materials and fixtures within the building.¹⁷ Although lead pipes and lead solder were not commonly used after 1986, water fountains and other fixtures were allowed to have up to 8 percent lead until 2014, as previously mentioned. Consequently, both older and newer school buildings can have lead in drinking water.¹⁸ Some water in a school building is not for

¹⁴In *ACORN v. Edwards*, 81 F.3d 1387 (5th Cir. 1996), the Federal Court of Appeals for the Fifth Circuit held that this requirement was unconstitutional under the Tenth Amendment to the U.S. Constitution because it directly compelled the state to enact and enforce a federal regulatory program and provided no options for the state to decline to do so. *Id.* at 1395. According to EPA documents, the decision did not restrict states from voluntarily developing their own programs to assist schools with lead testing and remediation.

¹⁵Pub. L. No. 111-380, § 2(a)(2), 124 Stat. 4131 (2011).

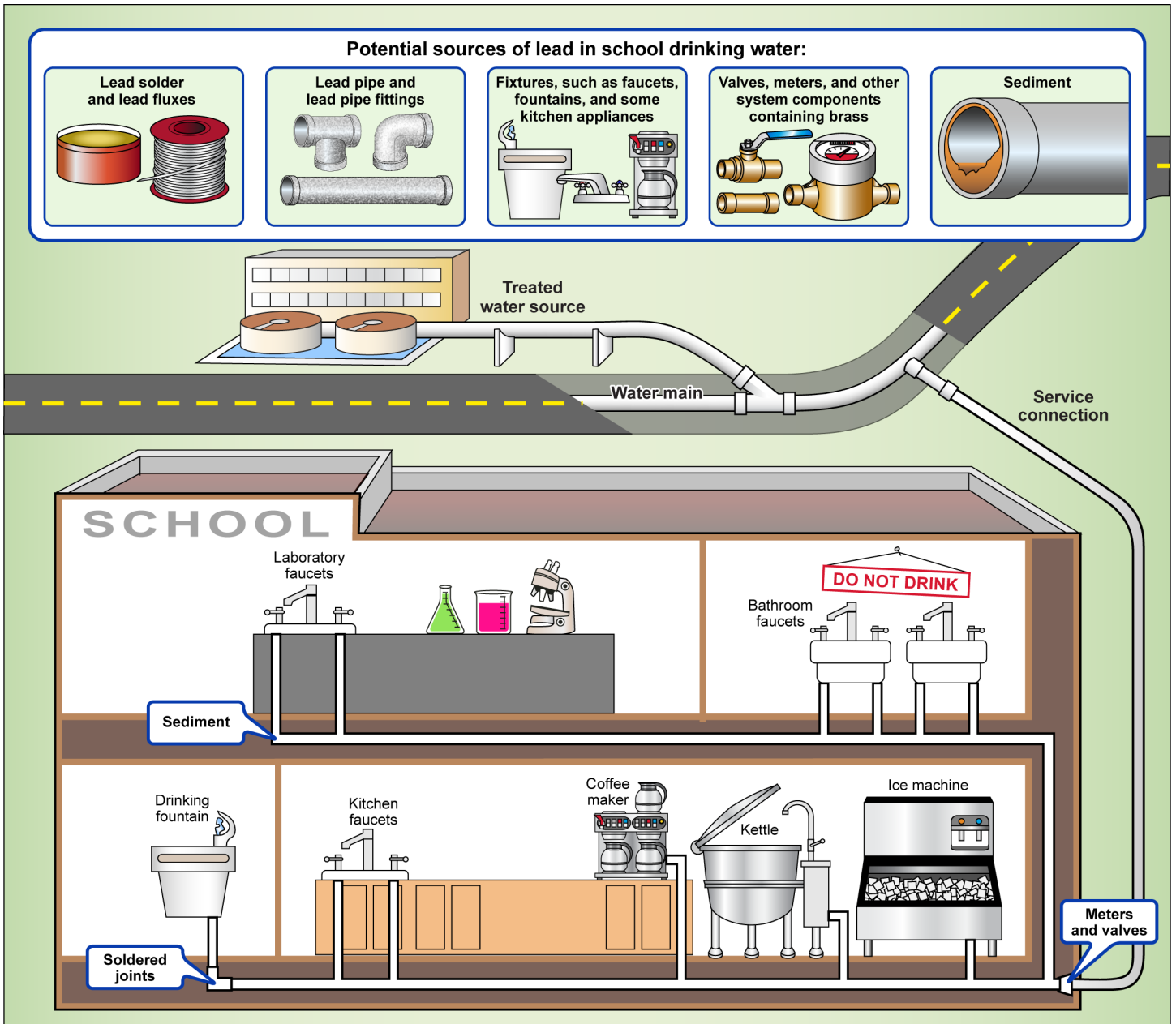
¹⁶Pub. L. No. 114-322, § 2107, 130 Stat. 1727-28 (2016).

¹⁷The most common problem is with brass faucets and fixtures with lead solder, from which significant amounts of lead can enter into the water, especially hot water.

¹⁸According to stakeholders and experts we interviewed, including officials at the American Water Works Association and the American Association of State Drinking Water Officials, traditional school buildings are unlikely to have lead service lines. This is because lead pipes are generally two inches or smaller, and schools are often large buildings with large pipes. However, non-traditional schools, such as charter schools, can be housed in smaller buildings that could have lead service lines. Since the early 1970s, when several medical studies confirmed that elevated blood lead levels are associated with negative health impacts, actions have been taken to reduce the public’s exposure to lead in drinking water, such as amendments to state building codes prohibiting the use of lead pipes.

consumption, such as water from a janitorial sink or garden hose, so lead in these water sources presents less risk to students. (See fig. 1.) The best way to know if a school's water is contaminated with lead is to test the water after it has gone through a school's pipes, faucets, and other fixtures.

Figure 1: Water Is Treated Before Reaching a School but Can Interact with Fixtures That Contain Lead in the Building



Source: GAO analysis of Environmental Protection Agency guidance. | GAO-18-382

Note: According to EPA, sediment containing lead may collect in low-lying sections of pipe resulting from minute particles of pipe or other deposits that accumulate over time.

EPA Guidance for Schools

To facilitate testing efforts, EPA suggests that schools implement programs for reducing lead in drinking water and developed the *3Ts for Reducing Lead in Drinking Water in Schools: Revised Technical Guidance* (3Ts guidance) in 2006, which provides information on:

- (1) training school officials about the potential causes and health effects of lead in drinking water;
- (2) testing drinking water in schools to identify potential problems and take corrective actions as necessary; and
- (3) telling students, parents, staff, and the larger community about monitoring programs, potential risks, the results of testing, and remediation actions.¹⁹

The purpose of the 3Ts guidance is to help schools minimize students' and staffs' exposure to lead in drinking water. The guidance provides recommendations and suggestions for how to address lead in school drinking water, but does not establish requirements for schools to follow. According to the guidance, if school districts follow the procedures described in guidance, they will be assured their facilities do not have elevated levels of lead in their drinking water. The guidance recommends taking 250 milliliter samples of water from every drinking water source in a school building and having the samples analyzed by an accredited laboratory.²⁰ Based on the test results of the samples, the guidance recommends remedial action if the samples are found to have an elevated concentration of lead, which is identified by using an action level. While school districts may have discretion to set their own action level, the 3Ts guidance strongly recommends taking remedial action if a school district finds lead at or above 20 ppb in a 250 milliliter sample of water.²¹

¹⁹ EPA, *3Ts for Reducing Lead in Drinking Water in Schools: Revised Technical Guidance* (Washington, D.C.: October 2006).

²⁰ Taking two or more samples from a water source can provide information on the potential source of the lead: Lead found in a sample of water that first flows from a fountain (a "first-draw" sample) may indicate that the fixture is the source of the lead; in contrast, lead found in a sample of water after letting the water run for a period of time (for example, 30 seconds to a minute) may indicate that the plumbing is the source of the lead.

²¹ EPA's 3T guidance uses a different testing protocol for testing drinking water in schools than the LCR—which is 15 ppb in a 1 liter sample—which governs public water systems, as previously discussed.

School districts can take a variety of actions including replacing pipes, replacing fixtures, running water through the system before consumption (known as flushing), or providing bottled water. However, since the amount of lead in school drinking water may change over time for a variety of reasons—for example, the natural aging of plumbing materials or a disturbance nearby, such as construction—the results obtained by one test are not necessarily indicative of results which may be obtained in the future.

Roles and Responsibilities of Federal Agencies

With no federal law requiring testing for lead in school drinking water, federal agencies play a limited role:

- Education’s mission includes fostering educational excellence and promoting student achievement, and the agency disseminates guidance to states and school districts about lead in school drinking water, but does not administer any related grants.
- EPA’s Office of Ground Water and Drinking Water provides voluntary guidance to schools on how to test for and remediate lead in school drinking water, as part of EPA’s mission to inform the public about environmental risks.²² In addition, EPA’s Office of Children’s Health Protection is responsible for working with EPA’s 10 regional offices via their healthy schools coordinators, who communicate with schools and help to disseminate the 3Ts guidance.²³
- CDC administers the School Health Policies and Practices Study, a periodic survey to monitor national health objectives that pertain to schools and school districts. The 2016 data, the most recent

²²The 3Ts guidance can be found at <https://www.epa.gov/dwreginfo/3ts-reducing-lead-drinking-water-schools-and-child-care-facilities>, accessed on January 12, 2018.

²³EPA is also responsible for setting federal standards for lead hazards in paint, soil, and dust, although these issues are beyond the scope of this review. 15 U.S.C. § 2683; see also Identification of Dangerous Levels of Lead, 66 Fed. Reg. 1206 (Jan. 5, 2001). For additional information on lead paint hazards in housing, see GAO, *Lead Paint in Housing: HUD Should Strengthen Grant Processes, Compliance Monitoring, and Performance Assessment*, GAO-18-394 (Washington, D.C.: June 19, 2018).

available, provide information on the number of school districts that periodically test for lead in their drinking water.²⁴

Under the 2005 memorandum signed by these three agencies to encourage lead testing and remediation in schools, Education's role includes working with EPA and other groups to encourage testing, and disseminating materials to schools. EPA agreed to update guidance for schools, and provide tools to facilitate testing for lead in school drinking water. CDC's role includes identifying public health organizations to work with and facilitating dissemination of materials to state health organizations.²⁵

²⁴In its 2016 School Health Policy and Practices Study of school districts, CDC estimated that about 50 percent of school districts (margin of error is plus or minus 5 percent) required schools to conduct periodic inspections of drinking water outlets for lead. The study does not include information about what school districts found as a result of testing. Funding for this study has been discontinued. CDC is also responsible for developing lead poisoning prevention programs and policies, collecting and tracking state data on blood lead levels in children nationwide, and providing funding to state and local health departments.

²⁵Education, EPA, and other federal agencies are members of the President's Task Force on Environmental Health Risks and Safety Risks to Children which published a national lead strategy focused on reducing children's exposure to lead-based paint in 2000. In November 2016, the Task Force released a report entitled *Key Federal Programs to Reduce Childhood Lead Exposures and Eliminate Associated Health Impacts* which describes federal efforts currently planned or underway to address all sources of lead exposure in children. CDC served on the Lead Poisoning Interagency Workgroup which contributed to the national strategy targeting lead paint hazards outlined in the 2000 report as well as served on the Lead Working Group which contributed to the 2016 report. The Task Force plans to release a new federal strategy on reducing children's exposure to all sources of lead, and the elimination of association health impacts, by summer 2018.

An Estimated 43 Percent of School Districts Reported Testing for Lead in Drinking Water and About a Third of These Districts Reported Finding Elevated Levels of Lead

Lead in School Drinking Water Survey Results at a Glance

- An estimated 43 percent of school districts tested for lead in school drinking water, but 41 percent did not, and 16 percent did not know.
 - Some districts tested drinking water in all sources of consumable water in all of their schools, while other school districts tested only some sources.
 - Among the reasons for not testing, school districts said they either did not identify a need to test or were not required to do so.
- Of those that tested, an estimated 37 percent of school districts found elevated lead levels—levels of lead above the district’s threshold for taking remedial action—in school drinking water.
 - School districts varied in terms of the threshold they used, with some using 15 ppb or 20 ppb and others using a lower threshold.
- School districts varied in whether they tested for lead in school drinking water and whether they discovered elevated levels of lead. For example, an estimated 88 percent of the largest 100 school districts tested compared with 42 percent of other school districts.
- All school districts that found elevated lead reported taking steps to reduce or eliminate the lead, including replacing water fountains or providing bottled water.

Source: GAO summary of survey results. | GAO-18-382




An Estimated 43 Percent of School Districts Reported Testing for Lead in Drinking Water in the Last 12 Months, but 41 Percent Have Not Tested

Nationwide, school districts vary in terms of whether they have tested for lead in school drinking water, with many not testing. According to our survey of school districts, an estimated 43 percent tested for lead in school drinking water in at least one school in the last 12 months, while 41 percent had not tested.²⁶ An estimated 35 million students were enrolled in districts that tested as compared with 12 million students in districts that did not test. An estimated 16 percent of school districts,

²⁶For additional information about our survey questions and estimates, see appendix II. The margin of error for these estimates are within plus or minus 7 percent.

enrolling about 6 million students, reported that they did not know whether they had tested or not. (See fig. 2.)²⁷

Figure 2: Estimated Number of Students among Public School Districts, According to Whether the District Tested for Lead in School Drinking Water or Not

Whether the school district tested or not	Estimated number of students (in millions)	
Tested		35
Did not test		12
Did not know whether they tested or not		6

Source: GAO survey of public school districts and Education data. | GAO-18-382

Note: GAO's estimate for the total number of students (about 53 million), based on our survey, is greater than the number actually enrolled (about 51 million), based on Education's Common Core of Data, due in part to sampling error and our stratified sample design, which included the 100 largest school districts.

Of school districts that tested for lead in school drinking water, some tested all consumable water sources in all of their schools, while others may have only tested some sources in all schools or all sources in some schools. Among the reasons provided by survey respondents for not testing in all schools, some said the age of the building was the primary consideration. For example, an official in one school district we visited told us they began testing in buildings constructed before 1989, but after receiving results that some water sources had elevated lead levels, the district decided to test all of their school buildings. Other reasons reported for testing some, but not all, schools included testing schools only when a

²⁷The margin of error for this estimate are within plus 7 percent and minus 4 percent.

complaint about discolored water was received or testing only new schools or schools that were renovated. In addition, school districts varied in whether they sampled from every consumable water source, or just some of the sources, in their schools. For example, one district official told us they took one sample from each type of water fountain in each school, assuming that, if a sampled fountain was found to have an elevated level of lead, then all of the other fountains of that type would also have elevated lead levels. However, EPA's 3Ts guidance recommends that every water source that is regularly used for drinking or cooking be sampled.²⁸ Further, stakeholders and environmental and educational officials we interviewed said that results from one water fountain, faucet, or any other consumable water source cannot be used to predict whether lead will be found in other sources.

Cost of Testing

In our survey, the median amount spent by school districts to test for lead in school drinking water during the past 12 months varied substantially, depending on the number of schools in which tests were conducted (see table 1). School districts may have paid for services such as collecting water samples, analyzing and reporting results, and consultants. For example, an official in a small, rural school district—with three schools housed in one building—told us his district spent \$180 to test all eight fixtures. In contrast, officials in a large, urban school district told us they spent about \$2.1 million to test over 11,000 fixtures in over 500 schools. Some school districts, especially larger ones, incurred costs to hire consultants to advise them and help design a plan to take samples, among other things.

²⁸EPA, *3Ts for Reducing Lead in Drinking Water in Schools* (Washington, D.C.: October 2006), p. 24. The guidance also recommends that, if possible, every outlet used for cooking or drinking should be sampled, regardless of whether it is regularly used for these purposes or not.

Table 1: Differences in Estimated Expenditures to Test for Lead in School Drinking Water

Number of schools in which tests were conducted	Estimated testing expenditures as reported by school districts		
	Minimum	Median	Maximum
1-10	\$100	\$2,000	\$30,000
11-50	\$100	\$10,000	\$352,000
51-100	\$2,200	\$40,000	\$350,000
101 or more	\$2,500	\$186,200	\$13,000,000

Source: GAO survey of public school districts. | GAO-18-382

Note: GAO’s survey was administered from July to October 2017 and asked school districts to report information based on the 12 months prior to their completing the survey. Only estimated expenditures of \$100 or more were used in this analysis.

Communication about Testing

EPA’s 3Ts guidance recommends determining how to communicate information about lead testing programs with parents, governing officials, and other stakeholders before testing.²⁹ Of school districts that reported testing for lead in school drinking water in our survey, an estimated 76 percent informed their local school board and 59 percent informed parents about their plans to test; similar percentages provided information about the testing results. We identified a range of approaches to communicating testing efforts in the 17 school districts we interviewed. Some school districts reported issuing press releases, putting letters in multiple languages in students’ backpacks, sending emails to parents, holding public meetings, and releasing information through social media. Before testing, one district created a website with a list of dates when it planned to test the drinking water in every one of its schools. In contrast, other school districts communicated with parents and the press only upon request. Officials in one district we visited said they did not post lead testing results on their website, because they wanted to avoid causing undue concern, adding that “more information isn’t necessarily better, especially when tests showed just trace amounts of lead.”

²⁹The guidance recommends school districts provide information to the community before testing for lead in drinking water, after the results of the testing are obtained, and in response to requests for information from the community.

Plans to Conduct Testing on a Recurring Basis

School districts generally have discretion to determine how frequently they test for lead in school drinking water except when prescribed in state law, and most school districts responding to our survey had no specific schedule for recurring testing. Specifically, an estimated:

- 27 percent of school districts plan to test “as needed,”
- 25 percent have no schedule to conduct recurring tests, and
- 15 percent do not know.³⁰

The remaining school districts reported a range of frequencies for conducting additional tests or said they were developing a schedule to conduct tests on a recurring basis. School district officials and stakeholders we interviewed told us that it is important to test for lead in drinking water on a recurring basis, because lead can leach into school drinking water at any time.

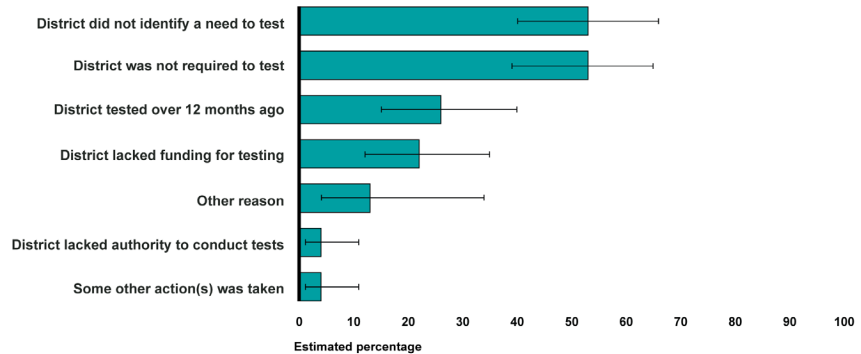
Reasons School Districts Reported for Not Testing

In our survey, we asked school districts reporting that they had not tested for lead in school drinking water in the last 12 months (41 percent of districts) to provide us with one or more reasons why they had not tested.³¹ Of these school districts, an estimated 53 percent reported that they did not identify a need to test and 53 percent reported they were not required to test (see fig. 3).

³⁰The margins of error for these estimates are within plus or minus 8 percent.

³¹We did not ask this question of the 16 percent of school districts reporting that they did not know whether they had tested for lead in school drinking water in the last 12 months or not.

Figure 3: Reasons Public School Districts Reported They Did Not Test for Lead in School Drinking Water



Source: GAO survey of public school districts. | GAO-18-382

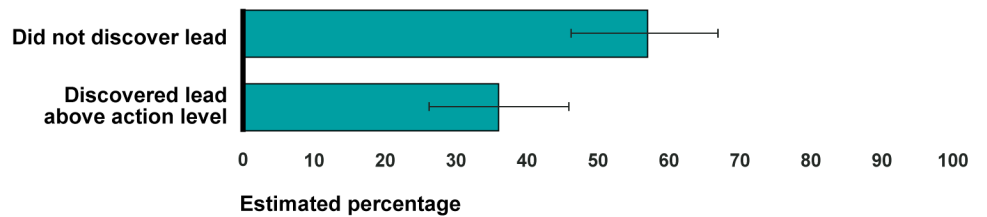
Note: GAO's survey was administered from July to October 2017 and asked school districts to report information based on the 12 months prior to their completing the survey. The thin bars display the 95 percent confidence interval for each estimate.

An Estimated 37 Percent of School Districts That Reported Testing Found Elevated Levels of Lead in Drinking Water

Of school districts that reported testing for lead in school drinking water, an estimated 37 percent of districts found elevated levels of lead in school drinking water, while 57 percent of districts did not find lead (see fig. 4).³² Of those that found lead in drinking water, most found lead above their selected action level in some of their schools, while some districts found lead above their action level in all of their schools. For example, officials in one large school district told us they tested over 10,000 sources of water, including drinking fountains and food preparation fixtures, and found that over 3,600 water sources had lead at or above the district's action level of 15 parts per billion (ppb). The findings resulted in extensive remediation efforts, officials said.

³²School districts that found any lead in even one source in one of its school buildings were expected to report that in our survey.

Figure 4: Estimated Percentages of Public School Districts Discovering Lead in School Drinking Water, of Those That Tested



Source: GAO survey of public school districts. | GAO-18-382

Note: GAO's survey was administered from July to October 2017 and asked school districts to report information based on the 12 months prior to their completing the survey. The thin bars display the 95 percent confidence interval for each estimate. The estimated percentage does not add up to 100 percent, because the number of other respondents—those who reported they discovered lead below their action level or those who reported they did not know whether they discovered lead or not—was too low for us to include in our estimates.

Further, district officials reported different action levels they used to determine when to take steps such as replacing a water fountain or installing a filter. School districts generally may select their own action level, resulting in different action levels between districts.³³ Of school districts that reported testing for lead in school drinking water, an estimated 44 percent set an action level between 15 ppb and 19 ppb.³⁴ The action levels chosen by the rest of the school districts ranged from a low of 1 ppb whereby action would be taken if any lead at all was detected to a high 20 ppb where action would be taken if lead was found at or above 20 ppb. (See appendix II for the estimated percentage of school districts that set other action levels.)

³³In some states, the action level is prescribed in state law.

³⁴The margin of error is plus 16 percent and minus 15 percent.

School Districts' Lead Testing Efforts and Discovery of Elevated Lead Levels Varied Based on the Size, Population Density, and Location of the District

Though fewer than half of school districts reported testing for lead in school drinking water, our analysis of school districts' survey responses shows that these estimates varied depending on the size and population density of the district as well as its geographic location.³⁵ For example, among the largest 100 school districts, an estimated 88 percent reported they had tested for lead in school drinking water in at least one school in the last 12 months compared with 42 percent of all other districts nationwide. An estimated 59 percent of the largest 100 school districts that tested discovered elevated levels of lead compared to 36 percent of all other districts that tested (see table 2).

Table 2: Differences in the Estimated Percentage of Public School Districts Reporting They Tested for Lead and Discovered Elevated Levels of Lead in School Drinking Water by Size and Population Density

Subgroup	Estimated percentage of school districts reporting they tested for lead in school drinking water	Of school districts that tested, estimated percentage reporting they discovered elevated levels of lead in school drinking water
Size		
<i>Largest 100 school districts</i>	88 (88,88)	59 (47,70)
<i>All other school districts</i>	42 (35,50)	36 (27,47)
Population density		
<i>Urban</i>	45 (34,57)	34 (20,53)
<i>Suburban</i>	64 (53,73)	53 (39,67)
<i>Rural</i>	33 (24,45)	25 (12,46)

Source: GAO survey of public school districts. | GAO-18-382

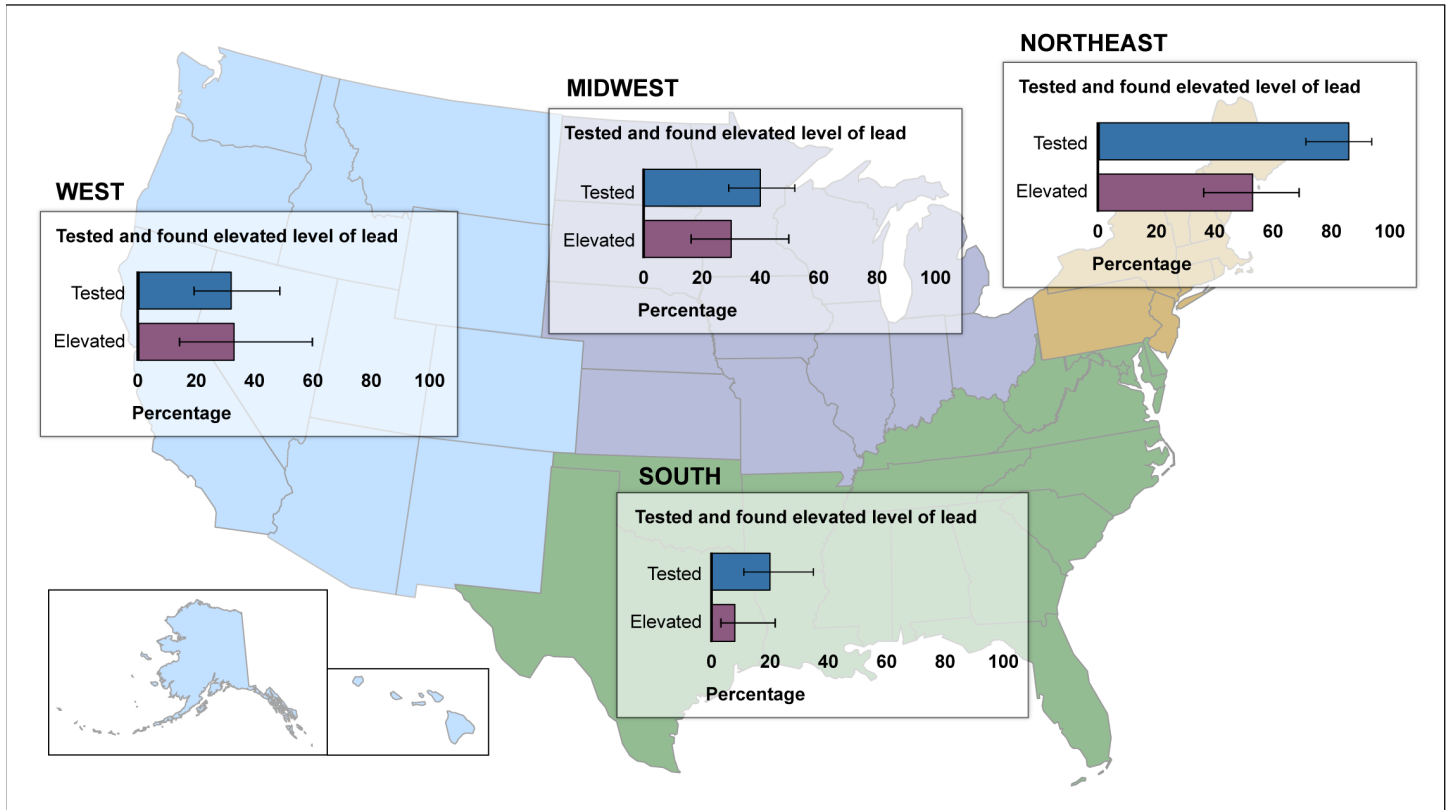
Note: GAO's survey was administered from July to October 2017 and asked school districts to report information based on the 12 months prior to their completing the survey. Numbers in parentheses are the lower and upper bounds of the estimates, using a 95 percent confidence interval.

In addition, an estimated 86 percent of school districts in the Northeast region of the United States tested for lead in school drinking water, compared to less than half of school districts in other geographic regions. Similarly, about half of school districts in the Northeast and about 8

³⁵We did not find any statistically significant differences when we compared estimated percentages among districts based on the district's poverty level, racial composition of the district's student body and whether the district was an urban charter school district. For information about charter school districts, see appendix III.

percent in the South found elevated levels of lead, compared to their selected action level. (See fig. 5.)

Figure 5: Estimated Percentage of Public School Districts by Region Reporting They Tested for and, of Those That Tested, Estimated Percentage That Discovered Elevated Levels of Lead in School Drinking Water



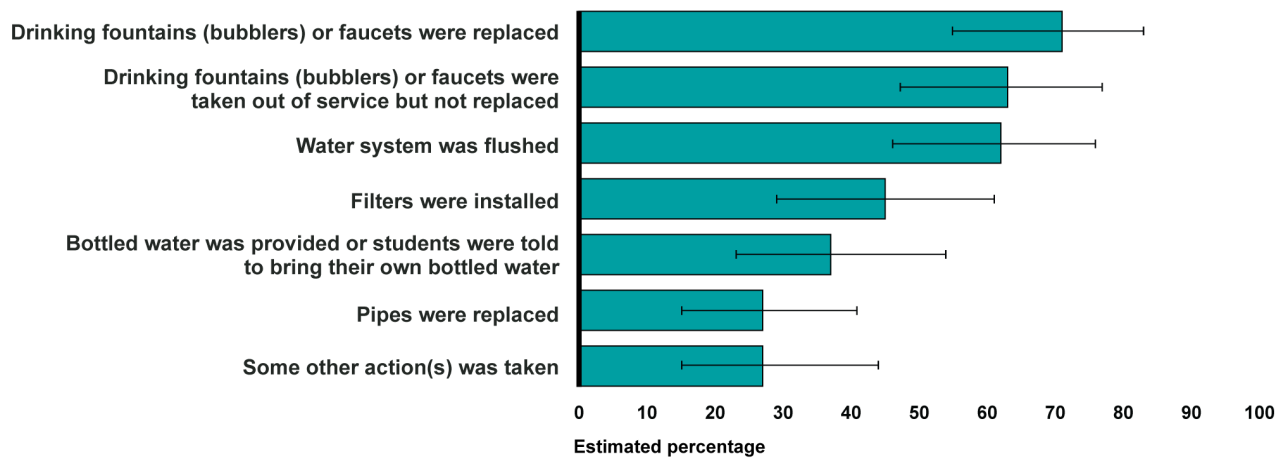
Sources: GAO survey of public school districts; Map Resources (map). | GAO-18-382

Note: GAO's survey was administered from July to October 2017 and asked school districts to report information based on the 12 months prior to their completing the survey. The thin bars display the 95 percent confidence interval for each estimate. Estimates of school districts that found elevated levels of lead were calculated from the school districts that reported they tested for lead in school drinking water. To determine if a district discovered an elevated level of lead, GAO included school districts which reported that they found lead in an amount that exceeded the district's own threshold for taking remedial action.

All School Districts with Elevated Lead in Drinking Water Reported Taking Action, Such as Replacing Water Fountains or Flushing Pipes

In our survey, every school district that reported finding lead in school drinking water above their selected action level reported taking steps to reduce or eliminate the lead.³⁶ For example, an estimated 71 percent said they replaced water fountains, 63 percent took water fountains out of service without replacing them, and 62 percent flushed the school's water system (see fig. 6).³⁷

Figure 6: Estimated Percentage of Public School Districts Reporting Specific Actions Taken to Remediate Lead Discovered in School Drinking Water



Source: GAO survey of public school districts. | GAO-18-382

Note: GAO's survey was administered from July to October 2017 and asked school districts to report information based on the 12 months prior to their completing the survey. Survey respondents could select more than one action, so the total estimated percentage sums to more than 100 percent. The thin bars display the 95 percent confidence interval for each estimate.

³⁶One school district reported it found lead above its action level in three of its schools, but it had not yet taken remedial action at the time of our survey. When we contacted the district, a district official told us that they shut off water at the sources as soon as lead was discovered and developed a remediation plan. However, funds were not available to begin remediation at the time the survey was completed. The district official told us that, after completing the survey, the district began remediation of lead in all affected schools.

³⁷Survey respondents could select more than one action, so the total estimated percentage sums to more than 100 percent.

Examples of remedial actions to address lead in school drinking water**Flushing**

Flushing, or running water for a period of time to remove stagnant water, is a short-term measure that schools can take to remediate elevated lead levels. Because standing water is more likely to leach lead, flushing is often done first thing in the morning, to remove water that has been in interior pipes and fixtures overnight. Depending on the outlet type and location, the 3Ts guidance recommends flushing for a minimum of 30 seconds and up to 15 minutes. However, lead levels can rebound over the course of the day, depending on water quality and plumbing materials. Also, flushing requires dedicated time and staff because it must be conducted on a regular basis to ensure water quality, and someone in the school building must be in charge of monitoring the flushing schedule. It can also waste a significant amount of water if the flushed water is not collected and used for a non-consumptive purpose.

Installing filters

Placing filters on fixtures and installing filtered bottle filler stations are measures that schools can take to remediate elevated lead levels. The 3Ts guidance recommends only using filters that have been certified to remove lead by NSF International, an independent, third-party certification organization. If filters are not maintained on a regular basis, they will become ineffective.

Installing new water fountains

School districts may be able to install new, lead-free water fountains to replace water fountains leaching lead.

Source: GAO analysis of documents from Environmental Protection Agency and Centers for Disease Control and Prevention. | GAO-18-382

School districts officials we interviewed told us they took a range of remedial actions generally consistent with those reported to us in our survey. For example, an official in one district told us that 129 of the 608 fixtures tested above the district's action level of "any detectable level." He said they installed filters on all of the 106 sink faucets with elevated lead and replaced all of the 23 drinking fountains with elevated lead.³⁸ The district official explained that they re-tested fixtures after the filters and new fountains were installed, and did not detect any lead in their drinking water. Officials in another school district told us that approximately 3,600 of their fixtures were found to have lead above their action level of 15 ppb. They told us the district turned off the water at the affected fixtures as an interim measure and provided bottled water to students and staff. Though they had not yet finalized their plans at the time of our interview, they said they were planning to replace the fixtures and replace old pipes with new pipes. District officials said they plan to pay for their remediation efforts using local capital improvement funds from a recently-approved bond initiative.

Similar to the cost of testing, the median amount spent by school districts to remediate lead in school drinking water during the past 12 months varied substantially, depending on the number of schools in which a district took action to remediate lead (see table 3). The median expenditure for school districts taking action in one to four schools was \$4,000 compared to a median expenditure for school districts taking action in 51 or more schools of \$278,000.

³⁸Several district officials we interviewed told us they did not like using filters because filters disintegrate over time and have to be replaced on a regular basis, which adds to their workload and costs. If filters are not replaced according to the manufacturer's recommended schedule, they may contain germs that would be harmful if consumed. With regard to this particular district, the district official told us that the manufacturer recommended replacing the filters semi-annually and that the filters had meters and an alarm to notify the consumer that the filter needed to be replaced.

Table 3: Differences in Estimated Expenditures Reported by Public School Districts to Take Action to Remediate Lead Discovered in School Drinking Water, By Number of Schools

Number of schools in which actions were taken to remediate lead in drinking water	Estimated remediation expenditures as reported by school districts		
	Minimum	Median	Maximum
1-4	\$100	\$4,000	\$18,000
5-10	\$900	\$10,000	\$100,000
11-50	\$2,100	\$45,000	\$900,000
51 or more	\$145,000	\$278,000	\$11,619,357

Source: GAO survey of public school districts. | GAO-18-382

Note: GAO's survey was administered from July to October 2017 and asked school districts to report information based on the 12 months prior to their completing the survey. Only estimated expenditures of \$100 or more were used in this analysis.


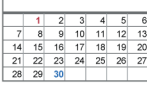




Several States Require School Districts to Test for Lead in Drinking Water and Additional States Provide Funding and Technical Assistance

**At Least Eight States
Require School Districts to
Test for Lead as of 2017,
According to EPA**

EPA regional officials provided examples of eight states that have requirements for schools to test for lead in drinking water as of September 2017: California, Illinois, Maryland, Minnesota, New Jersey, New York, Virginia, and the District of Columbia.³⁹ State requirements differ in terms of which schools are included, testing protocols, communicating results, and funding. (See fig. 7.) (For a list of testing components for the eight states, see appendix IV.)

³⁹For convenience, we have included the District of Columbia in our counts of states. We used available documentation to corroborate and verify the testing requirements of the states EPA identified. GAO did not conduct an independent search of state laws and EPA stated there may be more states with requirements, as EPA does not track state testing programs. In addition, Washington state passed legislation requiring testing for lead in school drinking water but, as of January 2018, had not appropriated funds for the required testing, according to state officials. However, the state is providing \$1.5 million a year in 2018 and 2019 to conduct voluntary testing for lead in drinking water, primarily in elementary schools, according to state officials. In addition, as of December 2017, Oregon was developing regulations to require all schools to test for lead in drinking water, according to state officials. Currently, the state requires schools districts to adopt a Safe and Healthy Schools Plan, which must include information on how the district plans to test for lead in school drinking water. EPA also provided us with an example of a state that plans to test for lead in school drinking water, even without a requirement. According to a state official, the Alabama State Departments of Education and of Environmental Management have set a goal to assist all public schools with testing for lead in drinking water over the next 2 years, even though there is no state requirement to do so.

Figure 7: Components of State Requirements for Schools to Test for Lead in School Drinking Water

<p>Which Schools?</p>  <p>All schools, including private and charter schools, can be included, or states can target testing based on risk, such as only elementary schools.</p>	<p>How Often?</p>  <p>Testing can be a one-time project, or states can mandate periodic re-testing.</p>	<p>Which Sources?</p>  <p>States can require that schools or districts test all or a subset of drinking water sources in a building.</p>
<p>Testing Protocol?</p>  <p>States can choose the sample size and the threshold for lead levels in water that require remediation, or leave the decision to schools or districts.</p>	<p>Who Pays?</p>  <p>States can provide funding for expenses such as collecting samples, lab analysis, and replacing plumbing or fixtures, or require schools, districts, or another entity to fund testing and remediation.</p>	<p>Communication?</p>  <p>States can require that testing plans, results, and remedial actions be reported to the state and community.</p>

Source: GAO summary of state legislation and policy documents about state requirements related to testing for and remediation of lead in school drinking water, as confirmed by state officials, as well as information gathered from state officials. | GAO-18-382

Note: The information summarized in this table is drawn from the requirements of the eight states that EPA provided as examples that have requirements to test for lead in school drinking water. According to EPA, these states are California, Illinois, Maryland, Minnesota, New Jersey, New York, Virginia, and the District of Columbia.

According to stakeholders we interviewed, most state legislation on testing for lead in school drinking water has been introduced in the past 2 years. Of the eight states, three states have completed one round of required testing, while other states are in the early stages of implementation or have not yet begun, according to state officials. School districts in Illinois, New Jersey, and New York completed a round of testing for lead in school drinking water by December 2017. Testing in the District of Columbia was in progress as of April 2018. Minnesota requires school districts to develop a plan to test by July 2018 and California requires that water systems sample all covered public schools in their service area by July 2019. According to state officials, schools in Maryland must test by July 2020. In Virginia, no timeline for testing is indicated in the requirement.

In addition, requirements in these eight states vary in terms of covered schools and frequency of testing.⁴⁰ For example, in Maryland, all schools, including charter and private schools, are required to test their water for lead by July 2020 and must re-test every 3 years. After regulations were approved in July 2016, New Jersey required testing within a year in all traditional public schools, charter schools, and certain private schools, and re-testing every 6 years, according to state officials. Illinois' requirement is for public and private elementary schools constructed before 2000 to test their drinking water for lead, and does not mandate re-testing. Seven of the eight states include at least some charter schools in their testing requirements (New York does not).⁴¹

State testing requirements also differ in terms of action level, sample sizes, and number of samples, according to state documents. States can choose their own lead threshold or action level for remediation, and the eight states have chosen levels ranging from any detectable level in Illinois to 20 ppb in Maryland. Six of the eight states have chosen to use 250 milliliter samples of water, while California is using a one liter sample size, and Virginia delegates to school districts to choose their action level and sample size.⁴² Some states specify that all drinking water sources in a building must be tested, such as in New York and New Jersey, or allow a smaller number of samples to be tested, such as in California, which recommends that water systems take between one and five samples per school. To implement its testing requirement, the District of Columbia has installed filters in all school drinking water sources, and plans to test the filtered water from each fixture for elevated lead annually.

The responsibility for the costs of testing and remediation also differ by state. According to state officials, in Minnesota, the costs of testing may be eligible for reimbursement from the state, and in the District of Columbia, the Department of General Services is responsible for the cost.⁴³ California requires that public water systems cover the cost of

⁴⁰Some of the state requirements may also encompass child care facilities, which was outside the scope of this report.

⁴¹State requirements may encompass charter schools without requiring all these schools to test for lead in drinking water. For example, Illinois requires only charter elementary schools to test.

⁴²Officials at the Virginia Department of Health told us they recommend that school boards use the 3Ts guidance to conduct testing.

⁴³However, officials said charter schools in the District of Columbia receive an annual facilities maintenance budget which can be used to pay for lead testing and remediation.

testing for all public schools in their jurisdiction. In all other states we looked at, schools or school districts are at least partially responsible for the costs of testing. Additionally, most schools or school districts are responsible for the costs of remediation, although Minnesota, New York, and the District of Columbia will provide funds to help with the costs of remediation as well.

Seven of the eight state requirements have a provision for communicating the results of lead sampling and testing in schools. For example, Minnesota requires all test results be made public and New York requires that results be communicated to students' families. Maryland and New Jersey require that results above the action level be reported to the responsible state agency, such as the Department of the Environment or the Department of Education, and that sample results that find elevated levels of lead be communicated to students' families. Illinois requires that all results be made available to families and that individual letters to families also be sent if lead levels over 5 ppb are found. In contrast, Virginia does not include a provision to communicate testing results in its testing requirement for schools.

According to stakeholders and state officials we interviewed, states have several other common issues to consider in implementing a state testing and remediation program. First, states need to ensure that their efforts, which can be significant given the thousands of schools that operate in each state, can be completed with limited resources and by a legislated deadline. Second, coordination between relevant state agencies, which will vary by state, may be challenging. Because of the nature of testing for lead in school drinking water, multiple government agencies may be involved, necessitating a balance of responsibilities and information-sharing between these state agencies. Finally, state officials told us that imposing requirements without providing funding to implement them may be a challenge for schools in complying with testing and remediation requirements.

Additional States Provided Funding and Technical Assistance to Support School District Efforts to Test for and Remediate Lead

Apart from the states with requirements to test for lead in school drinking water discussed in this report, at least 13 additional states had also provided funding or in-kind support to school districts to assist with voluntary lead testing and remediation, according to EPA regional offices. Those states are Arizona, Colorado, Idaho, Indiana, Maine, Massachusetts, Michigan, New Mexico, Ohio, Oregon, Rhode Island, Vermont, and Washington.⁴⁴ In Massachusetts, for example, officials told us the state used \$2.8 million from the state Clean Water Trust to fund a voluntary program for sampling and testing for all participating public schools in 2016 and 2017.⁴⁵ Massachusetts contracted with a state university to assist schools with testing for lead in drinking water. When the program completed its first round of testing in February 2017, 818 schools throughout the state had participated, and the state has begun a second round of sampling with remaining funds from the Clean Water Trust.⁴⁶ In Oregon, officials told us the state legislature provided funding for matching grants of up to \$8 million to larger school districts for facilities improvements, and made \$5 million of emergency funds available to reimburse school districts for laboratory fees associated with drinking water testing as part of the state's efforts to address student safety.

States can also provide technical assistance to support school districts in their efforts to test for and remediate lead in drinking water. The five

⁴⁴An example of in-kind support is in Idaho, where state laboratories offered free testing for lead in drinking water for all public schools.

⁴⁵The Massachusetts Clean Water Trust oversees the Massachusetts State Revolving Fund, a grantee of EPA's Drinking Water State Revolving Fund program. Through this program, EPA provides annual grants to states to help finance utility drinking water projects nationwide. States use this funding, and provide a required minimum 20 percent match, to provide low-cost loans or other financial assistance to communities for a wide range of water infrastructure projects. According to EPA, Indiana and New Mexico are also using funds from the Drinking Water State Revolving Fund to support voluntary testing in schools. In addition to funding state programs for testing and remediating lead in school drinking water, states use other federal grants to help implement and enforce the nation's environmental laws, including the Clean Water Act, the Clean Air Act, and the Safe Drinking Water Act. See GAO, *Funding for 10 States' Programs Supported by Four Environmental Protection Agency Categorical Grants*, GAO-13-504R (Washington, D.C.: May 6, 2013).

⁴⁶Even when funds are provided for testing, paying for remediation may be seen as a challenge. For example, Massachusetts provided funds to pay for voluntary sampling and testing for all public schools, and officials told us they still found that some eligible schools did not want to participate in the program because of the uncertainty of how much remediation measures might cost.

states we visited provided a range of technical assistance to school districts.⁴⁷ For example, to implement the voluntary assistance program in Massachusetts, the contracted university told us they hired 15 additional staff and assisted schools in designing sampling plans, taking samples, and sending them for testing. University officials told us they oversaw the sampling of all drinking water sources in each participating school and sent the sample to state certified laboratories for analysis. State officials encouraged schools to shut off all fixtures in which water tested at or above the action level of 15 ppb and provided guidance on actions to take, such as removing and replacing fixtures, using signage to indicate fixtures not to be used for drinking water, and implementing a flushing program. The state developed an online reporting tool so that all test results could be publicly posted. State officials also supported schools in communicating lead testing results to parents and the community.

Other states we visited provided technical assistance to school districts through webinars, guidance documents, in-person presentations, and responding to inquiries. In Oregon, the state Department of Education and the state Health Authority collaborated in 2016 to provide guidance to schools on addressing lead in drinking water. The Governor issued a directive requesting all school districts test for lead in their buildings and the Health Authority requested that districts send them the results. In Texas, officials at the Commission for Environmental Quality have made presentations to schools on water sampling protocols and provided templates for school districts to communicate results. Officials told us that an increased number of school districts have contacted them in the past year seeking guidance, and, in response, they directed districts to EPA's 3Ts guidance and a list of accredited laboratories. In Illinois, state officials partnered with the state chapter of the American Water Works Association to provide a guidance document for drinking water sampling and testing to assist schools in complying with new testing requirements. In Georgia, officials at the Department of Natural Resources told us they promote the 3Ts guidance on their website and have offered themselves as a resource on school testing at presentations with local water associations.

⁴⁷Information on technical assistance programs came from our site visits with five selected states (Illinois, Georgia, Massachusetts, Oregon, and Texas). We do not have comprehensive information on voluntary programs or technical assistance programs in all states.

EPA Provides Several Resources on Lead, but EPA and Education Should Provide More Information to Support States and School Districts and Improve Collaboration

EPA Provides Guidance, Training, and Technical Assistance on Lead Testing and Remediation, but States and School Districts Need Updated Guidance

EPA provides several voluntary resources, such as guidance, training, and technical assistance, to states and school districts regarding testing for and remediation of lead in school drinking water, but some school districts we surveyed and officials we interviewed said more information would be helpful. The Lead Contamination Control Act of 1988 (LCCA) required EPA to publish a guidance document and testing protocol to assist schools in their testing and remediation efforts.⁴⁸ EPA's Office of Ground Water and Drinking Water issued its 3Ts guidance which provides information on training school officials, testing drinking water in schools, and telling the school and broader community about these efforts.⁴⁹ Of the school districts that reported in our survey using the 3Ts guidance to inform their lead testing efforts, an estimated 68 percent found the guidance extremely or very helpful for conducting tests.⁵⁰ The Office of Ground Water and Drinking Water also developed an additional online resource—known as the 3Ts guidance toolkit—to further assist states and school districts with their lead in drinking water prevention programs by providing fact sheets and brochures for community

⁴⁸See Pub. L. No. 100-572, § 2(a), 102 Stat. 2884, 2886 (creating 42 U.S.C. § 300j-24) (1988).

⁴⁹The 3Ts guidance replaced Lead in Drinking Water in Schools and Non-Residential Buildings.

⁵⁰The margin of error is plus 13 percent and minus 16 percent.

members, among other things.⁵¹ Some states have used the 3Ts guidance as a resource for their state programs, according to EPA officials. For example, a New York regulation directs schools to use the 3Ts guidance as a technical reference when implementing their state-required lead testing and remediation programs.

The Office of Ground Water and Drinking Water provides training to support states and school districts with their lead testing and remediation programs. In June 2017, EPA started a quarterly webinar series to highlight school district efforts to test for lead.⁵² These webinars include presentations from school officials and key partners that conducted lead testing and remediation. For example, on June 21, 2017, officials from Denver Public Schools and Denver Water presented on their efforts to test for lead in the public school system.

EPA's approach to providing guidance and technical assistance to states and school districts is determined by each of the 10 EPA regional offices. Some EPA regional offices provide the 3Ts guidance to school districts upon request and others conduct outreach to share the guidance, typically through their healthy schools coordinator when discussing other topics, such as indoor air quality and managing chemicals.⁵³ EPA regional offices also provide technical assistance by request, typically through phone consultations with school districts that have questions regarding the 3Ts guidance, according to EPA headquarters officials. Officials also indicated that the agency has received more requests for technical assistance from schools over the past few years regarding lead in drinking water. Officials in EPA Regions 1 in Boston and 2 in New York City told us they provided technical assistance to school districts by conducting lead testing and analysis in school facilities and Region 9 in San Francisco provided technical assistance by reviewing school district

⁵¹The online toolkit is posted on EPA's website: U.S. Environmental Protection Agency, Training, Testing, Telling (3Ts) Full Toolkit, accessed February 1, 2018, <https://www.epa.gov/dwreginfo/training-testing-telling-3ts-full-toolkit>. Appendix V provides an example of a 2005 EPA brochure for the public about the 3Ts guidance.

⁵²EPA's case studies webinar series is posted on their website: U.S. Environmental Protection Agency, *Reducing Lead in Drinking Water in Schools and Child Care Facilities Case Studies Webinar Series*, accessed February 1, 2018, <https://www.epa.gov/dwreginfo/reducing-lead-drinking-water-schools-and-child-care-facilities-case-studies-webinar-series>.

⁵³EPA's healthy schools coordinators are responsible for sharing guidance and tools to help school districts create or enhance productive, healthy learning environments.

testing protocols.⁵⁴ For example, EPA Region 2 officials said between 2002 and 2016 they worked with one to two school districts per year to assist with their lead testing efforts. As part of this effort, the regional office provided funding for sampling and analysis. Officials said they prioritized school districts based on population size and whether the community had elevated blood lead levels.⁵⁵ Other EPA regional office approaches included identifying resources and guidance for relevant state agencies and facilitating information sharing by connecting districts that have tested for lead with districts that are interested in doing so. However, most EPA regional offices do not provide technical assistance in the form of testing, analysis, or remediation to school districts, and some do little or no outreach to communicate the importance of testing for and remediating lead in school drinking water. According to federal standards for internal control, management should externally communicate the necessary quality information to achieve the entity's objectives.⁵⁶

Each EPA regional office's approach to providing resources to states and school districts varies based on differing regional priorities and available resources, according to EPA headquarters officials. Additionally, officials said that this decentralized model of providing support and technical assistance related to lead testing and remediation in schools is appropriate because of the number of schools across the United States. However, based on our survey we found school district familiarity with the 3Ts guidance varied by geographic area (see fig. 8). An estimated 54 percent of school districts in the Northeast reported familiarity with the 3Ts guidance, compared with 17 percent of districts in the South.⁵⁷ Furthermore, the Northeast was the only geographic area with more school districts reporting that they were familiar with the 3Ts guidance

⁵⁴Additional EPA regions may have conducted lead testing for schools as part of their historical efforts to implement the LCCA. In 2017, EPA Region 9 officials told us they supported tribal schools in their region by conducting lead testing using an action level of 15 ppb in a 250 milliliter sample.

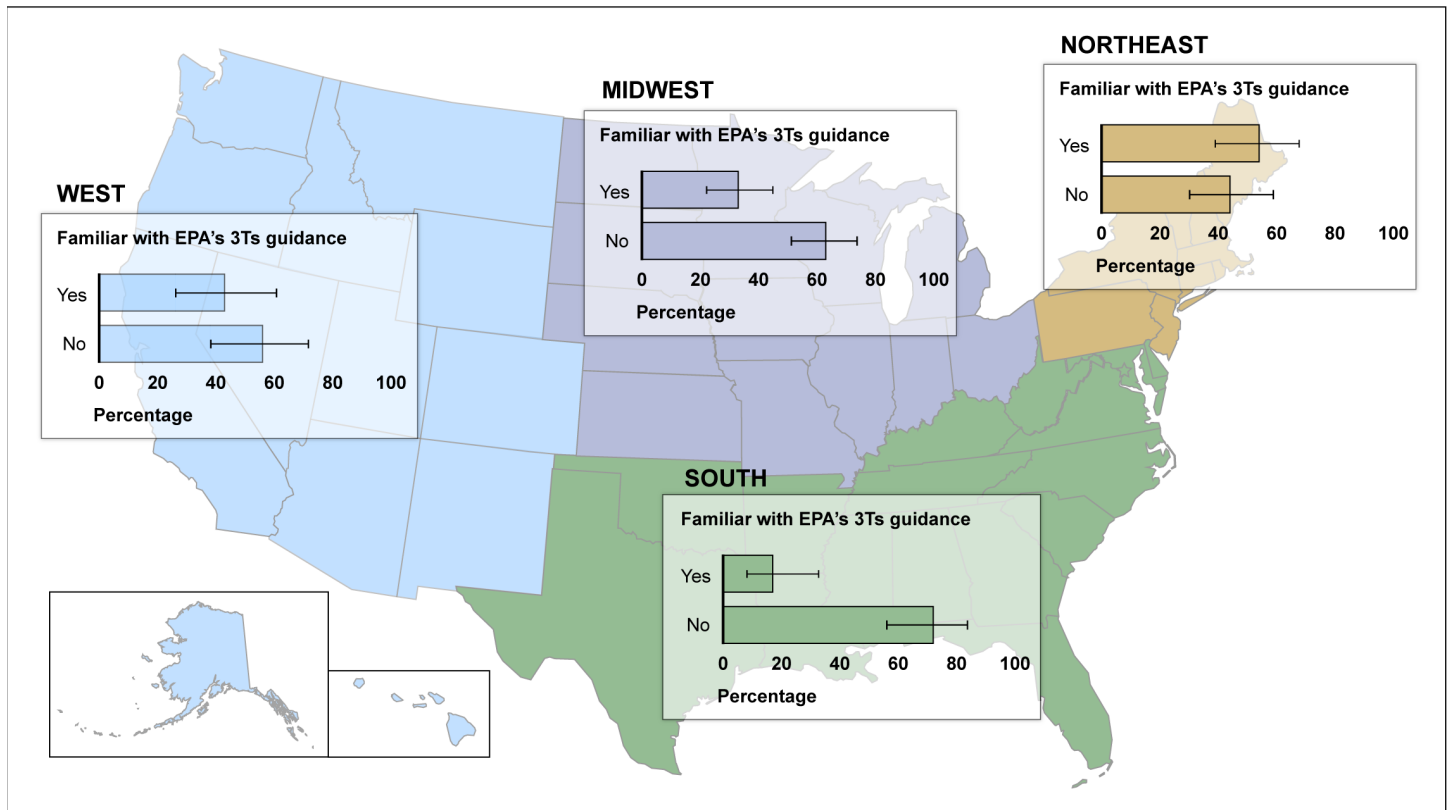
⁵⁵As of July 2017, EPA Region 2 officials said they will continue to conduct outreach to school districts to encourage lead testing and remediation, but will redirect their efforts towards childcare facilities, because New York and New Jersey have initiated their own state lead testing programs for school districts.

⁵⁶GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: Sept. 10, 2014).

⁵⁷The margin of error for the Northeast estimate is plus 14 percent and minus 15 percent and for the South estimate is plus 16 percent and minus 9 percent.

than not. This awareness corresponds with the efforts made by the state of Massachusetts and EPA's regional offices in the Northeast to distribute the 3Ts guidance and conduct lead testing and remediation in school districts.

Figure 8: Estimated Percentage of Public School Districts by Region That Were Familiar with the Environmental Protection Agency's 3Ts for Reducing Lead in Drinking Water in Schools



Sources: GAO survey of public school districts; Map Resources (map). | GAO-18-382

Note: GAO's survey was administered from July to October 2017 and asked school districts to report information based on the 12 months prior to them completing the survey. The thin bars display the 95 percent confidence interval for each estimate. Some respondents reported they did not know whether officials in their school district were familiar with the 3Ts for Reducing Lead in Drinking Water in Schools.

By promoting further efforts to communicate the importance of lead testing to schools to help ensure that their lead testing programs are in line with good practices included in the 3Ts guidance, EPA regional offices that have not focused on this issue could leverage the recent efforts of other regional offices to provide technical assistance and guidance, and other forms of support.

EPA's 3Ts guidance emphasizes the importance of taking action to remediate elevated lead in school drinking water, but the agency's guidance on a recommended action level for states and school districts is

not current and contains elements that could be misleading. Although the guidance recommends that school districts prioritize taking action if lead levels from water fountains and other outlets used for consumption exceed 20 ppb (based on a 250 milliliter water sample), EPA officials told us when the guidance was originally developed in response to the 1988 LCCA requirement, the agency did not have information available to recommend an action level specifically designed for schools.⁵⁸ Furthermore, EPA officials told us that the action level in the 3Ts guidance is not a health-based standard. However, there are statements in the guidance that appear to suggest otherwise. For example, the guidance states that EPA strongly recommends that all water outlets in all schools that provide water for drinking or cooking meet a “standard” of 20 ppb lead or less and that school officials who follow the steps included in the document, including using a 20 ppb action level, will be “assured” that school facilities do not have elevated lead in the drinking water. The use of the terms “standard” and “assured” are potentially misleading and could suggest that the 20 ppb action level is protective of health.

Further, state and school district officials may be familiar with the 15 ppb action level (based on a 1 liter water sample) for public water systems aimed at identifying system-wide problems under the LCR, which may also create confusion around the 20 ppb action level included in the 3Ts guidance.⁵⁹ According to our survey, an estimated 67 percent of school districts reported using an action level less than the 20 ppb recommended in the 3Ts guidance. We found that nearly half of school districts used action levels between 15 ppb and 19 ppb. Although these action levels—the 20 ppb from the 3Ts guidance and the 15 ppb from the LCR—are intended for different purposes, the difference creates confusion for some state and school district officials. Also, according to our survey, an estimated 56 percent of school districts reported they would find it helpful to have clearer guidance on what level of lead to use as the action level

⁵⁸In January 1989, EPA issued guidance recommending that school districts conduct testing for lead in their drinking water by collecting 250 milliliter water samples from water fountains and fixtures. This guidance also recommended that school districts take those fountains or fixtures out of service if the lead level exceeded 20 ppb.

⁵⁹As previously mentioned, in 1991, EPA issued the LCR which established a maximum contaminant level goal of zero, because EPA concluded that there was no established safe level of lead exposure. EPA did not establish an enforceable maximum contaminant level, and established an action level of 15 ppb as a level that EPA believed was generally representative of what could be feasibly achieved.

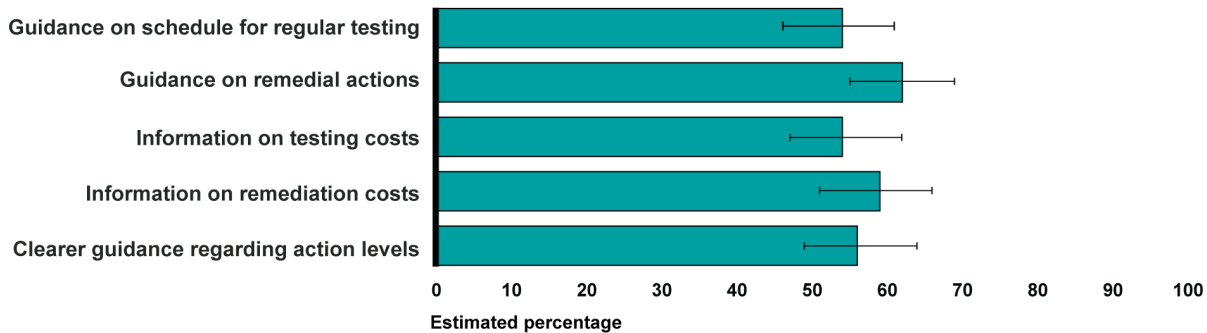
for deciding to take steps to remediate lead in drinking water.⁶⁰ In addition, officials we interviewed in four of the five states we visited said there is a need for clearer guidance on the action level. EPA officials agreed that the difference between the two action levels creates confusion for states and school districts.⁶¹

In addition to wanting clearer guidance on choosing lead action levels, about half of the school districts we surveyed said they would also like additional information to help inform their lead testing and remediation programs. Specifically, school districts reported that they want information on a recommended schedule for lead testing, how to remediate elevated lead levels, and information associated with testing and remediation costs (see fig. 9). For example, an estimated 54 percent of school districts responded that they would like additional information on a testing schedule, as did officials in 10 of the 17 school districts and one of the five states we interviewed. EPA's 3Ts guidance does not include information to help school districts determine a schedule for retesting their schools. Officials in one school district told us they need information for determining retesting schedules for lead in their school drinking water, and that—without guidance—they chose to retest every 5 years, acknowledging that this decision was made without a clear rationale. Further, an estimated 62 percent of school districts reported wanting additional information on remedial actions to take to address elevated lead. For example, officials from the Massachusetts Department of Environmental Protection told us that they would like additional guidance on evaluating remedial actions to address elevated lead in the fixtures or the plumbing system. Officials with EPA's Office of Ground Water and Drinking Water hold quarterly meetings with regional officials to obtain input on potential improvements to the 3Ts guidance, but have not made any revisions.

⁶⁰The estimated percentage is based on school districts that responded that clearer guidance on what level of lead to use as an action level would be "extremely" or "very" helpful.

⁶¹In the preamble to the original LCR issued in 1991, EPA acknowledged the potential for these differing action levels to cause confusion, and stated its intention to provide further explanation of the difference as necessary.

Figure 9: Estimated Percentage of Public School Districts That Expressed Interest in Additional Information on Lead in School Drinking Water Testing and Remediation



Source: GAO survey of public school districts. | GAO-18-382

Note: GAO’s survey was administered from July to October 2017 and asked school districts to report information based on the 12 months prior to them completing the survey. Estimated percentages are based on school districts that responded that additional information on lead testing and remediation would be “extremely” or “very” helpful. The thin bars display the 95 percent confidence interval for each estimate.

EPA has not substantially updated the 3Ts guidance since October 2006 and does not have firm plans or time frames for providing additional information, including on the action level and other key topics such as a recommended schedule for testing. EPA officials said that they may update the 3Ts guidance before the LCR is updated, but did not provide a specific time frame for doing so. EPA has efforts underway to reconsider the action level for the LCR, which may include a change in the action level from one that is based on technical feasibility, to one that also considers lead exposure in vulnerable populations such as infants and young children, which EPA refers to as a health-based benchmark.⁶² EPA anticipates issuing comprehensive revisions to the LCR by February 2020. While the 3Ts guidance is not contingent on the LCR, EPA officials told us they would consider updates to the 3Ts guidance, including the 20 ppb action level, as they consider revisions to the LCR. By updating the

⁶²As part of EPA’s efforts to revise the LCR, the agency is considering establishing a health-based benchmark for lead in drinking water to provide states, drinking water systems, and the public with a greater understanding of the potential health implications for vulnerable populations of specific levels of lead in drinking water. EPA has developed potential scientific modeling approaches to define the relationship between lead levels in drinking water and blood lead levels. EPA has conducted expert peer review of these alternative approaches to inform future consideration of a health-based benchmark for the LCR revisions. This review considered various modeling methods that could be used to assess the relationship between constant rate lead exposures of a representative child and a population of children across different age ranges and blood lead levels.

3Ts guidance to include an action level for school districts that incorporates available scientific modeling regarding vulnerable population exposures, EPA could have greater assurance that school districts are able to limit children's exposure to lead.

EPA has emphasized the importance of addressing elevated lead levels in school drinking water through its 3Ts guidance, but has not communicated necessary information about action levels and other key topics consistent with the external communication standard under federal standards for internal control.⁶³ According to EPA, CDC, and others, eliminating sources of lead before exposure can occur is considered the best strategy to protect children from potential adverse health outcomes. EPA officials also told us that clear guidance is important because testing for lead in drinking water requires technical expertise. But without providing interim or updated guidance to help school districts choose an action level for lead remediation EPA will continue to provide schools with confusing information regarding whether to remediate, which may not adequately limit potential lead exposure to students and staff. Furthermore, without important information on key topics, such as a recommended schedule for lead testing, how to remediate elevated lead levels, and information associated with testing and remediation costs school districts are at risk of making misinformed decisions regarding their lead testing and remediation efforts.

Education Has Not Played a Significant Role in Lead Testing and Remediation in Schools or Collaborated with EPA on These Efforts

Education has not played a significant role in supporting state and school districts efforts to test for and remediate lead in school drinking water, and there has been limited collaboration between Education and EPA, according to officials. In 2005, Education, EPA, CDC, and other entities involved with drinking water signed the *Memorandum of Understanding on Reducing Lead Levels in Drinking Water in Schools and Child Care Facilities* (the memorandum) to encourage and support schools' efforts to test for lead in drinking water and to support actions to reduce children's exposure to lead.⁶⁴ According to the memorandum, Education's role is to identify the appropriate school organizations with which to work and facilitate dissemination of materials and tools to schools in collaboration with EPA. In addition, EPA's role is to update relevant guidance documents for school districts—resulting in the production of the 3Ts

⁶³[GAO-14-704G](#).

⁶⁴Appendix VI provides a copy of the 2005 memorandum.

guidance in 2006—raising awareness, and collaborating with other federal agencies and associations, among other things.⁶⁵ Education officials told us that the agency does not have any ongoing efforts related to implementing the memorandum. However, Education and EPA officials were not aware of the memorandum being terminated by either agency and told us the memorandum remains in effect.⁶⁶

Although Education does not have any ongoing efforts related to implementing the memorandum, the agency's websites, including the Readiness and Emergency Management for Schools Technical Assistance Center (REMS TA Center) website, and the Green Strides portal, provide links to EPA guidance and webinars on lead testing and remediation.⁶⁷ The REMS TA Center website, which is largely focused on emergency management planning, includes a link to EPA's 3Ts guidance and other resources on lead exposure and children, but does not provide information regarding the importance of testing for lead in school drinking water. Education's Green Strides portal includes a link to a number of EPA's webinars on lead in school drinking water, but does not include all of the quarterly webinars started in June 2017 to highlight school district efforts to test for lead. An Education official told us that these EPA webinars are identified by Education without coordinating with EPA officials. Further, when searching on Education's website for lead in school drinking water, the 3Ts guidance does not show up. Education officials acknowledged that information regarding lead testing and remediation is difficult to find on Education's website and they could take

⁶⁵According to the memorandum, CDC is responsible for identifying appropriate public health organizations to work with on messaging, and dissemination of guidance, working with EPA to disseminate information to state health departments, and assisting with the development of guidance and tools to assist school district testing efforts. In the course of our audit work, we determined that, although CDC is mentioned in the memorandum, it does not have a significant role to play in encouraging testing by school districts.

⁶⁶CDC officials we spoke with regarding the memorandum were not aware of any recent efforts to implement its provisions and stated that records of any previous efforts to implement the memorandum were disposed of under the agency's record retention policy.

⁶⁷The REMS TA Center serves as a clearinghouse of information for districts and schools to assist in the development of high-quality emergency operations plans, offering various virtual and in-person trainings, technical assistance, and practitioner tools. In 2013, Education created the Green Strides portal to connect school districts with resources related to Education's Green Ribbon Schools award, which honors schools and districts that demonstrate leadership in making schools healthier and more sustainable.

steps to make federal guidance on lead in school drinking water more accessible.⁶⁸

The federal government has developed guidelines to help federal agencies improve their experience with customers through websites. One such resource is Guidelines for Improving Digital Services developed by the federal Digital Services Advisory Group.⁶⁹ It states that federal agencies should take steps to make guidance easy to find and accessible. Making guidance easy to find and accessible such as by clarifying which links contain guidance; highlighting new or important guidance; improving their websites' search function; and categorizing guidance on Education's websites could help raise school district awareness of the guidance, which is currently low in most areas of the country.

Many school districts are not familiar with EPA guidance related to lead testing and remediation. Specifically, an estimated 60 percent of school districts reported in our survey that they were not familiar with the EPA's 3Ts guidance. Most school district officials from our site visits told us they did not have contact with EPA prior to or during their lead testing and some said they would not have thought to go to EPA for guidance. Likewise, EPA officials reported they had received feedback from school district officials indicating that they do not know where to go for information about testing for and remediating lead in drinking water. Rather, school district officials may look to their state educational agency or Education for guidance on lead testing and remediation, as they might do when looking for guidance on other topics.

Education and EPA do not regularly collaborate to support state and school districts' efforts related to lead in school drinking water, according to EPA and Education officials. Education officials said the agency does not have a role in ensuring safe drinking water in schools, and that the

⁶⁸A link to resources located on the REMS TA Center website and a link to EPA's 3Ts guidance were disseminated by Education's Office of Safe and Healthy Students through an electronic newsletter to over 15,000 subscribers, including state educational agencies, and others interested in safe and healthy schools in December 2017.

⁶⁹The President's Digital Government Strategy charged the Office of Management and Budget with convening an advisory group to provide input on priorities for the General Services Administration's digital services innovation center and to recommend government-wide best practices, guidance, and standards. This group will draw membership from the Federal Chief Information Officers Council, Federal Web Managers Council, and other agency leaders.

mitigation of environmental health concerns in school facilities is a state and local function. Therefore, the agency does not collaborate with EPA to disseminate the 3Ts guidance beyond posting links to related guidance on their websites and newsletters. EPA officials told us they do not know which office they should collaborate with at Education. EPA regional officials also said they do not collaborate with Education to disseminate the guidance to states and school districts.⁷⁰ However, in the 2005 memorandum, EPA and Education agreed to work together to encourage school districts to test drinking water for lead; disseminate results to parents, students, staff, and other interested stakeholders; and take appropriate actions to correct elevated lead levels.

There are many school districts that have not tested for lead in school drinking water, and some conducted testing without the assistance of federal guidance—although the large majority (68 percent) of school districts who use the guidance reported finding it helpful. Officials in 11 of 17 school districts we interviewed that had conducted lead testing told us they were familiar with the 3Ts guidance and 9 of those districts said they found it helpful for designing their lead testing programs. Increased encouragement and dissemination of EPA resources about lead in school drinking water by Education and EPA could help school districts test for and remediate lead in drinking water using good practices and reduce the potential risk of exposure for students and staff.

Conclusions

Children are particularly at risk of experiencing the adverse effects of lead exposure from a variety of sources, including drinking water. While there is no federal law requiring lead testing for drinking water in most schools, some states and school districts have decided to test for lead in the drinking water to help protect students. However, there are a number of school districts that have not tested for lead and some that do not know if they have tested for lead in their drinking water, according to our nationwide survey. Even in states and school districts that have opted to test, officials may choose different action levels to identify elevated lead

⁷⁰Education also has a new initiative known as the Federal Partners in School Health to support state and school district efforts to promote healthy school environments. Education coordinates with EPA on this initiative, but not with officials from the Office of Ground Water and Drinking Water and the Office of Children's Health Protection. Education officials told us that, thus far, lead in school drinking water has not been a focus of this initiative.

and may choose different testing protocols that do not test all fixtures in all schools.

EPA has developed helpful guidance—3Ts—and webinars for states and school districts to support efforts to test and remediate lead in school drinking water. However, some EPA regional offices have not communicated the importance of testing for and remediating lead to states and school districts. By promoting further efforts to communicate the importance of lead testing to school districts to help ensure that their lead testing programs are in line with good practices, including the 3Ts guidance, regional offices that have not focused on this issue could build on the recent efforts of other regional offices to provide technical assistance and guidance and other forms of support.

State and school district officials can use EPA’s 3Ts guidance to help ensure that their drinking water testing and remediation efforts are in line with good practices and said that it has been helpful for establishing their programs. However, statements in the guidance—which has not been updated in over a decade—that suggest the action level described will ensure that school facilities do not have elevated lead in their drinking water are misleading. In addition, state and school district officials told us that additional guidance—including information on a recommended schedule for retesting as well as on costs associated with testing and remediation—could help school districts make more informed decisions regarding their testing and remediation efforts. Without providing interim or updated guidance, EPA is providing schools with confusing and out of date information, which can increase the risk of school districts making uninformed decisions. EPA officials said they would consider updates to the 3Ts action level while the revisions to the LCR are being completed. However, the longer school districts are without the additional information they need to conduct their efforts in line with good practices and continue to rely on confusing and misleading information, the more challenges they will face in trying to limit children’s exposure to lead. After EPA revises the LCR, the agency would have greater assurance that school districts are limiting children’s exposure to lead by considering whether to develop, as part of its guidance, a health-based level for schools that incorporates available scientific modeling regarding vulnerable population exposures.

Finally, although Education provides information to states and school districts on lead testing and remediation through the agency’s websites, that information is difficult to find. Further, Education’s website does not include all of EPA’s quarterly webinars to highlight school district efforts to

test for lead. By making guidance accessible, Education could improve school district awareness of EPA resources about lead in school drinking water. In addition, EPA and Education should improve their collaboration to encourage and support lead testing and remediation efforts by states and school districts. EPA has the expertise to develop guidance and provide technical assistance to states and school districts, while Education, based on its mission to promote student achievement, should collaborate with EPA to disseminate guidance and raise awareness of lead in drinking water as an issue that could impact student success. Although over one-third of districts that tested found elevated levels of lead, many districts have still not been tested. Unless EPA and Education encourage additional school districts to test for lead, many students and school staff may be at risk of lead exposure.

Recommendations for Executive Action

We are making a total of seven recommendations, including five to EPA and two to Education:

- The Assistant Administrator for Water of EPA's Office of Water should promote further efforts to communicate the importance of testing for lead in school drinking water to address what has been a varied approach by regional offices. For example, the Assistant Administrator could direct those offices with limited involvement to build on the recent efforts of several regional offices to provide technical assistance and guidance, and other forms of support. (Recommendation 1)
- The Assistant Administrator for Water of EPA's Office of Water should provide interim or updated guidance to help schools choose an action level for lead remediation and more clearly explain that the action level currently described in the 3Ts guidance is not a health-based standard. (Recommendation 2)
- The Assistant Administrator for Water of EPA's Office of Water should, following the agency's revisions to the LCR, consider whether to develop a health-based level, to include in its guidance for school districts, that incorporates available scientific modeling regarding vulnerable population exposures and is consistent with the LCR. (Recommendation 3)
- The Assistant Administrator for Water of EPA's Office of Water should provide information to states and school districts concerning schedules for testing school drinking water for lead, actions to take if lead is found in the drinking water, and costs of testing and remediation. (Recommendation 4)

-
- The Assistant Secretary for Elementary and Secondary Education should improve the usability of Education’s websites to ensure that the states and school districts can more easily find and access federal guidance to address lead in school drinking water, by taking actions such as clarifying which links contain guidance; highlighting new or important guidance; improving their websites’ search function; and categorizing guidance. (Recommendation 5)
 - The Assistant Administrator for Water of EPA’s Office of Water and the Director of the Office of Children’s Health Protection should collaborate with Education to encourage testing for lead in school drinking water. This effort could include further dissemination of EPA guidance related to lead testing and remediation in schools or sending letters to states to encourage testing in all school districts that have not yet done so. (Recommendation 6)
 - The Assistant Secretary for Elementary and Secondary Education should collaborate with EPA to encourage testing for lead in school drinking water. This effort could include disseminating EPA guidance related to lead testing and remediation in schools or sending letters to states to encourage testing in all school districts that have not yet done so. (Recommendation 7)

Agency Comments

We provided a draft of this report to EPA, Education, and CDC for review and comment. EPA and Education provided written comments that are reproduced in appendixes VII and VIII respectively. EPA also provided technical comments, which we incorporated as appropriate. CDC did not provide comments. We also provided relevant excerpts to selected states and incorporated their technical comments as appropriate.

In its written comments, EPA stated that it agreed with our recommendations and noted a number of actions it plans to take to implement them. For example, EPA said its Office of Ground Water and Drinking Water is holding regular meetings with regional offices and other EPA offices to obtain input on improving the 3Ts guidance. Potential revisions include updates to implementation practices, the sampling protocol, and the action level, including clarifying descriptions of different action levels and standards.⁷¹ Also, EPA said that while it has not yet

⁷¹In its comments about the report, EPA used the phrase ‘remediation trigger’ to refer to the action levels in schools and told us they intend it to differentiate the term from the action level in the LCR.

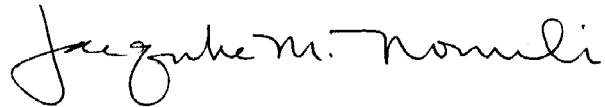
determined the role of a health-based benchmark for lead in drinking water in the revised LCR, it sees value in providing states, drinking water systems, and the public with a greater understanding of the potential health implications for vulnerable populations of specific levels of lead in drinking water. EPA said it would continue to reach out to states and schools to provide information, technical assistance, and training and will continue to make the 3Ts guidance available. EPA also said it would work with Education to ensure that school districts and other stakeholders are aware of additional resources EPA is developing.

In its written comments, Education stated that it agreed with our recommendations and noted a number of actions it plans to take to implement them. In response to our recommendation to improve Education's websites, Education said it would identify and include an information portal dedicated to enhancing the usability of federal resources related to testing for and addressing lead in school drinking water. Also, Education said it is interested in increasing coordination across all levels of government and it shares the view expressed in our report that improved federal coordination, including with EPA, will better enhance collaboration to encourage testing for lead in school drinking water. Education said it would develop a plan for disseminating relevant resources to its key stakeholder groups and explore how best to coordinate with states to disseminate EPA's guidance on lead testing and remediation to school districts.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to interested congressional committees, the Administrator of the Environmental Protection Agency, the Secretary of Education, the Director of the Centers for Disease Control and Prevention, and other interested parties. In addition, the report will be 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 us at (617) 788-0580 or nowickij@gao.gov or (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 listed in appendix IX.



Jacqueline M. Nowicki, Director
Education, Workforce, and Income Security Issues



J. Alfredo Gómez, Director
Natural Resources and Environment

List of Requesters

The Honorable Patty Murray
Ranking Member
Committee on Health, Education, Labor, and Pensions
United States Senate

The Honorable Frank Pallone, Jr.
Ranking Member
Committee on Energy and Commerce
House of Representatives

The Honorable Paul D. Tonko
Ranking Member
Subcommittee on Environment and the Economy
Committee on Energy and Commerce
House of Representatives

The Honorable Brian Schatz
United States Senate

The Honorable Rosa DeLauro
House of Representatives

The Honorable Mike Quigley
House of Representatives

Appendix I: Objectives, Scope, and Methodology

In this report, we examined three objectives: (1) the extent to which school districts are testing for, finding, and remediating lead in school drinking water; (2) the extent to which states require or support testing for and remediating lead in school drinking water by school districts; and (3) the extent to which federal agencies are supporting state and school district efforts to test for and remediate lead. To address these objectives, we conducted a web-based survey of school districts, interviews with selected state and school district officials, a review of applicable requirements in selected states, a review of relevant federal laws and regulations, and interviews with federal agency officials and representatives of stakeholder organizations.

We conducted this performance audit from October 2016 through July 2018 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.

Web-based Survey of School Districts

To examine the extent to which school districts are testing for and remediating lead in school drinking water, we designed and administered a generalizable survey of a stratified random sample of U.S. local educational agencies (LEA), which we refer to as school districts throughout the report.¹ The survey included questions about school district efforts to test for lead in school drinking water, such as the number of schools in which tests were conducted, the costs of testing, and whether parents or others were notified about the testing efforts. We also asked questions about remediation efforts, such as whether lead was discovered in school drinking water, the specific remediation efforts that were implemented, and whether parents or others were notified about the remediation efforts. Further, we asked about officials' familiarity with the Environmental Protection Agency's (EPA) guidance entitled 3Ts for Reducing Lead in Drinking Water in Schools, (3Ts guidance) whether the guidance was used, and the extent to which it was helpful in conducting

¹The survey asked whether any of the district's schools received water from a public water system. If so, the district was included in our survey. Schools that do not receive water from a public water system, but rather are their own water system, are regulated under lead testing rules issued pursuant to the Safe Drinking Water Act and thus not part of our review.

tests, remediating lead, and communicating with parents and others. We directed the survey to school district superintendents or other cognizant officials, such as facilities directors. See appendix II which includes the survey questions and estimates.

We defined our target population to be all school districts in the 50 U.S. states and the District of Columbia that are not under the jurisdiction of the Department of Defense or Bureau of Indian Education. We used the LEA Universe database from Department of Education's (Education) Common Core of Data (CCD) for the 2014-2015 school year to our sampling frame. For the purpose of our survey, our sample was limited to school districts that:

- were located in the District of Columbia or the 50 states;
- had a LEA type code of 1, 2, 4, 5, 7, and 8;
- had one or more schools and one or more students; and
- were not closed according to the 2014-2015 School Year.²

The resulting sample frame included 16,452 school districts and we selected a stratified random sample of 549 school districts. We stratified the sampling frame into 13 mutually exclusive strata based on urban classification and poverty classification. We further stratified the school districts classified as being in a city by charter status. We selected the largest 100 school districts with certainty. We determined the minimum sample size needed to achieve precision levels of plus or minus 12 percentage points or fewer, at the 95 percent confidence level. We then increased the sample size within each stratum for an expected response rate of 70 percent.

We defined the three urban classifications based on the National Center for Education Statistics (NCES) urban-centric locale code. To build a general measure of the poverty level for each school district we used the

²We included school districts with the following TYPE codes: 1 (local school district that is not a component of a supervisory union); 2 (local school district component of a supervisory union sharing a superintendent and administrative services with other local school districts); 4 (regional education services agency or a county superintendent serving the same purpose); 5 (state-operated agency charged, at least in part, with providing elementary and/or secondary instruction or services to a special-needs population); 7 (all schools associated with the agency are charter schools, which is often referred to as an "independent charter district"); and 8 (other education agencies that do not fit into the other categories).

proportion of students eligible for free or reduced-price lunch (FRPL) as indicated in the CCD data and classified these into the following three groups:

- High-poverty – More than 75 percent of students in the school district were eligible for FRPL;
- Mid-poverty – Between 25.1 and 75.0 percent of students in the school district were eligible for FRPL; and
- Low-poverty – 25 percent or fewer students in the school district were eligible for FRPL.

We assessed the reliability of the CCD data by reviewing existing documentation about the data and performing electronic testing on required data elements and determined they were sufficiently reliable for the purpose of our report.

We administered the survey from July to October 2017 (the survey asked school districts to report information based on the 12 months prior to their completing the survey.) To obtain the maximum number of responses to our survey, we sent reminder emails to nonrespondents and contacted nonrespondents over the telephone. We identified that four of the 549 sampled school districts were closed and one was a “cyber-school” with no building, so these were removed from the sample. Of the remaining 544 eligible sampled school districts, we received valid responses from 373, resulting in an unweighted response rate of 68 percent.

We conducted an analysis of our survey results to identify potential sources of nonresponse bias using a multivariate logistic regression model. We examined the response propensity of the sampled school districts by several demographic characteristics. These characteristics included poverty, urbanicity, and charter status. We did not find any other population characteristics significantly affected survey response propensity except those used in stratification (charter schools and the largest 100 school districts). Based on the response bias analysis and the 68 percent response rate across stratum, we determined that estimates based on adjusted weights reflecting the response rate are generalizable to the population of eligible school districts and are sufficiently reliable for the purposes of this report.

Table 4: Description of Sample Frame, Stratification, and Samples Sizes for the Stratified Random Sample of School Districts

Stratum	Population size (number of school districts)	Sample size	Number of completed surveys
1="Largest 100 Schools - Students"	100	100	83
2="City - Public, High Poverty (>75.0% Free or Reduced- Priced Lunch (FRPL))"	170	11	3
3="City - Public, Mid Poverty (25.1-75.0% FRPL)"	551	24	16
4="City - Public, Low Poverty (0-25.0% FRPL)"	100	8	4
5="City - Charter, High Poverty (>75.0% FRPL)"	913	51	25
6="City - Charter, Mid Poverty (25.1-75.0% FRPL)"	670	29	15
7="City - Charter, Low Poverty (0-25.0% FRPL)"	206	13	6
8="Suburban - High Poverty (>75.0% FRPL)"	469	23	14
9="Suburban - Mid Poverty (25.1-75.0% FRPL)"	1908	52	34
10="Suburban - Low Poverty (0-25.0% FRPL)"	1319	62	47
11="Town/Rural - High Poverty (>75.0% FRPL)"	1219	47	36
12="Town/Rural - Mid Poverty (25.1-75.0% FRPL)"	7624	80	57
13="Town/Rural - Low Poverty (0-25.0% FRPL)"	1203	49	33
Total	16,452	549	373

Source: GAO, based on Department of Education data. | GAO-18-382.

We took steps to minimize non-sampling errors, including pretesting draft instruments and using a web-based administration system. As we began to develop the survey, we met with officials from seven school districts to explore the feasibility of responding to the survey questions. We then pretested the draft instrument from April to June 2017 with officials in eight school districts—including one charter school district—in cities and suburbs in different states. In the pretests, we asked about the clarity of the questions and the flow and layout of the survey. The EPA also reviewed and provided us comments on a draft version of the survey. Based on feedback from the pretests and EPA’s review, we made revisions to the survey instrument. To further minimize non-sampling errors, we used a web-based survey, which allowed respondents to enter their responses directly into an electronic instrument. Using this method automatically created a record for each respondent and eliminated the errors associated with a manual data entry process.

We express the precision of our particular sample’s results as a 95 percent confidence interval (for example, plus or minus 10 percentage points). This is the interval that would contain the actual population value for 95 percent of the samples we could have drawn. As a result, we are

95 percent confident that each of the confidence intervals in this report will include the true values in the study population.

To analyze differences in the percentages of school districts that reported they tested for lead in school drinking water and those that discovered lead, we compared weighted survey estimates generated for school districts in different levels of the following subgroups:

- Poverty: low poverty, mid poverty, and high poverty;
- Racial composition: majority-minority and majority white;
- Region: Northeast, South, Midwest, and West;
- Population density: urban, suburban, and rural/town;
- Urban charter school: in urban areas, charter district and non-charter district; and
- Largest 100: largest 100 districts (based on student enrollment) and all other districts.

For each subgroup, we produced percentage estimates and standard errors for each level and used these results to confirm the significance of the differences between weighted survey estimates.³

Site Visits to School Districts and Interviews with State and School District Officials

To examine school districts' testing and remediation efforts and state support of those efforts, we conducted site visits in five states—Georgia, Illinois, Massachusetts, Oregon, and Texas—from February to October 2017. We selected these states because they varied in the extent to which they required testing of school drinking water for lead and they are located in geographic areas covered by different EPA regional offices. Within these states, we selected 17 school districts that had tested for lead in school drinking water and to achieve variation in the size and population density (urban, suburban, and rural) of the district as well as including one charter school district.

Site visits generally consisted of interviews with officials in state agencies and school districts and officials in the local EPA regional office:

³We used a 95 percent confidence level as a measure of general significance. We chose this as the measure of significance because this analysis was designed to be a confirmatory analysis to provide additional evidence that the observed differences in the weighted estimates were not a result of other factors.

- State interviews: We interviewed officials in state environment, education, and health agencies, depending on whether they had information related to school district testing for lead in school drinking water in their state. The topics we discussed were the agencies' roles and responsibilities related to testing for and remediation of lead in school drinking water, any related state requirements, policies, and guidance, communication and public notification about testing and remediation efforts and, as appropriate, coordination among multiple state agencies. We also discussed similar topics related to lead-based paint. In Massachusetts, we interviewed representatives with the University of Massachusetts, because of their role in implementing the state's program to support school district efforts to test for lead in school drinking water.
- School Districts: Within the five site visit states, we interviewed officials in 14 school districts in person and in three school districts by phone (because we were not able to meet with them in person). We also selected one charter school that functions as its own school district which had conducted tests for lead in school drinking water. Similar to our school district survey, the interview topics we discussed with district officials included testing for and remediation of lead in school drinking water, use of guidance (such as the 3Ts guidance) and efforts to communicate or coordinate with any federal, state, or local agencies, including any other school districts. Within 13 of the school districts, we visited at least one school in which the district had tested for lead in drinking water and, as needed, took remedial action in order to gain an in-depth understanding of their testing and remediation efforts.
- EPA Regional Offices: We interviewed officials in all 10 EPA Regional offices. We met in-person with officials in the regional offices 1, 4, 5, and 6 and conducted phone interviews with officials in regional offices 2, 3, 7, 8, 9, and 10. We generally discussed EPA officials' roles and responsibilities related to testing for lead in school drinking water and paint and efforts in states and school districts in their region.

Information we gathered from these interviews, while not generalizable, represents the conditions present in the states and school districts at the time of our interviews and may be illustrative of efforts in other states and school districts.

Review of State Requirements

As part of our effort to examine school districts' testing and remediation efforts and state support of those efforts, we reviewed related state requirements. To determine whether states had related requirements, we

asked all EPA regional offices if states in their region had requirements related to testing for lead in school drinking water. EPA provided examples of eight states (California, Illinois, Maryland, Minnesota, New Jersey, New York, Virginia, and the District of Columbia) that had such requirements. We reviewed relevant laws, regulations, and policy documents for these states. We then confirmed the details of the related requirements with the appropriate state officials via structured questionnaires. Also, we used available documentation to corroborate and verify the testing requirements of the states that EPA identified. GAO did not conduct an independent search of state laws.

Review of Federal Laws and Regulations, and Interviews with Federal Agency Officials

To examine the extent to which federal agencies have collaborated in supporting state and school district efforts to test for and remediate lead, we reviewed relevant federal laws, including the Water Infrastructure Improvements for the Nation Act of 2016, Reduction of Lead in Drinking Water Act of 2011, the Safe Drinking Water Act of 1974, as amended, and the Lead Contamination Control Act of 1988; regulations, such as the Lead and Copper Rule; and guidance, such as the 3Ts guidance. We also reviewed documentation including the

- Memorandum of Understanding on Reducing Lead Levels in Drinking Water in Schools and Child Care Facilities signed in 2005 by EPA, Education and the Centers for Disease Control and Prevention (CDC);
- Federal Partners in School Health Charter;
- EPA training webinar information; and
- other relevant guidance including the 3Ts guidance tool kit.

We interviewed officials from EPA's Office of Ground Water and Drinking Water and Office of Children's Health Protection and officials in all 10 of EPA regional offices regarding their approach to providing support to states and school districts on lead testing and remediation. We interviewed officials from Education's Office of Safe and Healthy Students and officials from the CDC. During these interviews, we interviewed officials about the Memorandum of Understanding and about the Federal Partners in School Health initiative, both of which represent collaborative efforts that address lead in school drinking water, among other topics.

We evaluated federal efforts to collaborate and support lead testing and remediation in schools against federal standards for internal control, which call for agencies to communicate quality information to external

parties, among other things.⁴ We also evaluated federal efforts against the Memorandum of Understanding, in which EPA, Education, and CDC agreed to encourage testing drinking water for lead and communicate with key stakeholders, among other things.⁵

Interviews with
Stakeholder Organizations

To inform all of our research objectives, we interviewed representatives with the National Conference of State Legislatures, National Center for Healthy Housing, National Alliance of Public Charter Schools, the DC Public Charter School Board, and the 21st Century School Fund. We also attended a workshop entitled “Eliminating Lead Risks in Schools and Child Care Facilities” in December 2017.

⁴GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: Sept. 10, 2014).

⁵U.S. Environmental Protection Agency, Department of Education, and Centers for Disease Control and Prevention, *Memorandum of Understanding on Reducing Lead Levels in Drinking Water in Schools and Childcare Facilities* (Washington, D.C.: June 15, 2005).

Appendix II: Survey of Lead Testing and Remediation Efforts

The questions we asked in our survey of local educational agencies (referred to in this report as school districts) are shown below. Our survey was comprised of closed- and open-ended questions. In this appendix, we include all survey questions and aggregate results of responses to the closed-ended questions; we do not provide information on responses provided to the open-ended questions. Estimates noted with superscript “a” are based on 20 or fewer responses and were not included in our findings. For a more detailed discussion of our survey methodology, see appendix I.

Section A: Background

1. Do any schools in your local educational agency (LEA) obtain drinking water from a public water system such as a city or municipal water plant? (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Yes	88	83	92
No (Skip to 20)	10	6	15
Don't know (Skip to 20)	2 ^a	1	4

Section B: Testing for Lead in School Drinking Water

2. Is there a requirement that the drinking water in your LEA's schools be tested for lead? (Please answer “Yes” regardless of whether that requirement comes from your state, municipality, local educational agency or any other governmental entity.) (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Yes	59	51	66
No	26	21	33
Don't know	15	10	21

3. Regardless of whether your LEA is required to test for lead in school drinking water, have tests been conducted for lead in the drinking water in at least one of your schools in the past 12 months? (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Yes	43	36	50
No	41	34	48
Don't know	16	12	23

If yes to 3:

3A. What is the number of schools in which tests were conducted in the past 12 months?

Response	Estimated Number (Mean)	95 percent confidence interval – lower bound (number)	95 percent confidence interval – upper bound (number)
(Respondent reported number)	7.53	6.04	9.02

3B. About how many samples were taken from sources of drinking water such as water fountains and sinks in each school? (Check one.)¹

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
All	61	50	71
Most	19	12	29
About Half	11 ^a	6	20
Some	9	5	15

¹Response options to this question included an option to report “None.” However, we determined that option did not make sense, so we disregarded those responses from our analysis.

3C. Did any of the following develop the sampling plan, draw the samples of water, and analyze the samples? (Check all that apply.)

Response		Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
a. LEA Personnel	Developed the sampling plan	35	26	46
	Draw the samples of water	27	19	38
	Analyze the samples	2 ^a	0	5
	Don't know	8 ^a	4	17
b. Contractor hired for the purpose of lead testing	Developed the sampling plan	41	32	52
	Draw the samples of water	43	34	53
	Analyze the samples	54	44	65
	Don't know	5 ^a	2	13
c. Other	Developed the sampling plan	23	15	34
	Draw the samples of water	21	13	32
	Analyze the samples	30	20	41
	Don't know	7 ^a	3	14

3D. What size samples were taken? (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
250 milliliters	40	30	51
1 liter	8	4	16
Other	2 ^a	1	6
Don't know	50	39	60

If 'other' to 3D: What sample size was used?

[open-ended]

3E: To the best of your knowledge, did the personnel drawing or analyzing samples follow a testing protocol that offers guidance on developing the sampling plan, drawing samples of water, or analyzing samples? (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Yes	85	76	91
No (Skip to 3F)	4 ^a	1	8
Don't know (Skip to 3F)	11 ^a	6	20

If 'yes' to 3E: a. To the best of your knowledge, were any of the following entities involved in developing the protocol? (Check one per row.)

Response		Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Your LEA	Yes	48	35	60
	No	51	38	63
	Don't know	2 ^a	0	5
Contractor / water testing company	Yes	76	63	85
	No	15	8	27
	Don't know	9 ^a	3	21
Environmental consultant	Yes	33	23	45
	No	39	28	52
	Don't know	28 ^a	17	42
Water supplier	Yes	33	22	47
	No	55	41	67
	Don't know	12 ^a	6	25
EPA or another federal government agency	Yes	30	20	43
	No	41	30	54
	Don't know	29	18	43
A state government agency	Yes	45	33	58
	No	26	17	37
	Don't know	29	18	43
A local government agency (aside from your LEA)	Yes	39	27	53
	No	34	24	46
	Don't know	27	16	41
Other	Yes	5 ^a	1	20
	No	53	39	67
	Don't know	41	28	57

If 'other' to 3Eh: What other entities were involved in developing the protocol?

[open-ended]

3F. If tests were conducted in some schools in your LEA in the past 12 months—but were not conducted in every school—how was it determined which schools would be tested?

(Check one per row.)

Not applicable: tests were conducted in every school (Skip to 3G)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Checked	79	70	86
Not checked	21	14	30

Response		Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Age of school	Yes	54	30	77
	No	40 ^a	19	66
	Don't know	6 ^a	1	31
Whether school was an elementary School	Yes	15 ^a	6	34
	No	79	57	92
	Don't know	6 ^a	1	32
Number of students in the school	Yes	10 ^a	2	34
	No	84	59	95
	Don't know	6 ^a	1	33
Our LEA tests some schools, but not all schools, every year; all schools are tested over the course of several years	Yes	7 ^a	2	29
	No	83	60	94
	Don't know	9 ^a	2	32
Other	Yes	46	23	71
	No	41 ^a	19	67
	Don't know	13 ^a	4	36

If 'other' to 3Fe: In what other ways did your LEA use to determine which schools would be tested?

[open-ended]

3G. How much do you estimate your LEA has spent on testing for lead in school drinking water in the past 12 months? (Please answer this question for lead testing only; the survey asks about expenditures to address concerns identified through testing later. Also, please include materials, labor, and any other expenditures related to lead testing in your estimate.)

Response	Estimated Number (Median)	95 percent confidence interval – lower bound (number)	95 percent confidence interval – upper bound (number)
(Respondent reported number)	1,393	489	2,650

3H. Did your LEA use any of the following sources of funding for the testing in the past 12 months? (Check one per row).

Response		Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Your LEA	Yes	71	59	80
	No	23	14	34
	Don't know	7 ^a	3	13
State government agency	Yes	23	15	33
	No	60	48	71
	Don't know	18 ^a	10	29
Federal government agency	Yes	0 ^a	0	0
	No	80	68	88
	Don't know	20 ^a	12	32
Other	Yes	8 ^a	3	18
	No	73	60	82
	Don't know	19 ^a	11	31

If 'other' to 3H: What other sources of funding did your LEA use?

[open-ended]

3I. In the past 12 months, did your LEA notify the following groups that it was planning to test for lead in school drinking water before conducting the tests? (Check one per row).

Response		Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Local school board	Yes	76	65	84
	No	19	11	29
	Don't know	6 ^a	3	11
Parents	Yes	59	47	69
	No	35	25	47
	Don't know	6 ^a	3	11
General public (e.g., media)	Yes	46	35	57
	No	44	33	56
	Don't know	10 ^a	5	18
A state government agency	Yes	41	31	52
	No	44	33	55
	Don't know	15	8	26
Other	Yes	6	2	16
	No	70	57	80
	Don't know	24	15	37

If 'other' to 3I: What other groups did your LEA notify that it was planning to test for lead in school drinking water before conducting the tests?

[open-ended]

3J. In the past 12 months, did your LEA report the testing results to the following groups after completing the tests? (Check one per row).

Response		Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Local school board	Yes	80	70	87
	No	15	9	24
	Don't know	5 ^a	3	10
Parents	Yes	65	54	75
	No	26	17	37
	Don't know	9 ^a	5	17
General public (e.g., media)	Yes	57	46	68
	No	30	21	42
	Don't know	12 ^a	6	22
A state government agency	Yes	50	39	61
	No	35	25	47
	Don't know	15 ^a	8	26
Other	Yes	11	6	21
	No	58	46	70
	Don't know	31	20	44

If 'other' to 3J: To what other groups did your LEA report the testing results?

[open-ended]

3K. If 'no' to 3: Were any of the following a reason your LEA did not conduct any tests in any schools in the last 12 months? (Check one per row).

Response		Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
LEA did not identify a need to test	Yes	53	40	66
	No	22 ^a	12	37
	Don't know	25 ^a	15	38
LEA tested over 12 months ago	Yes	26 ^a	15	40
	No	55	41	68
	Don't know	20 ^a	11	33
LEA was not required to test	Yes	53	39	65
	No	21 ^a	12	34
	Don't know	27 ^a	16	41
LEA lacked funds for testing	Yes	22 ^a	12	35
	No	60	46	73
	Don't know	18 ^a	10	31
LEA lacked authority to conduct tests	Yes	4 ^a	1	11
	No	69	54	80
	Don't know	27 ^a	16	42
Schools were responsible to test, not the LEA	Yes	4 ^a	1	11
	No	77	63	86
	Don't know	20 ^a	11	34
Other	Yes	13 ^a	4	34
	No	44	28	62
	Don't know	42	26	60

If 'other' to 3K: For what other reasons did your LEA not conduct any tests in any schools in the last 12 months?

[open-ended]

4. Does your LEA have a schedule for recurring tests to determine the amount of lead in the drinking water in your schools within any of the following time frames? (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Yes, at least once a year	12	8	17
Yes, every two years	3 ^a	2	6
Yes, less frequently than every two years	7	4	12
Not now, but our LEA is developing a schedule	11	7	16
No, but our LEA will test as needed	27	21	34
No	25	19	33
Don't know	15	10	21

Section C: Remediation of Lead in School Drinking Water

5. Has your LEA discovered any level of lead in the drinking water of any of your schools (as a result of testing) in the last 12 months? (Check one.)²

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Yes	41	31	52
No, we tested, but did not discover any lead in school drinking water	57	46	67
No, our LEA has not tested	1 ^a	0	5
Don't know	1 ^a	0	4

²Percentage estimates in this table are for those who responded “Yes” to Question 3, that they had tested for lead in school drinking water.

5A. What lead concentration (measured in “parts per billion” or “ppb”) did your LEA use to initiate remedial action? (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Any detectable level	7 ^a	3	16
5 to 9 ppb	9 ^a	3	27
10 to 14 ppb	7 ^a	3	15
15 to 19 ppb	44	29	60
20 ppb or above	14 ^a	8	25
Other	10 ^a	5	21
Don't know	9 ^a	2	27

If ‘other’ to 5A: What lead concentration did your LEA use to initiate remedial action?

[open-ended]

5B. In the last 12 months, how many schools had at least one test result—including as few as one sample in one school—greater than the lead level your LEA used to initiate action? (Please answer regardless of whether these results were discovered in the first of multiple rounds of testing.)

[open-ended]

5C.To address lead discovered in school drinking water, has your LEA taken any of the following actions in any of your schools in the past 12 months?

Response		Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Water system was flushed	Yes	62	46	76
	No	36	23	53
	Don't know	1 ^a	0	7
Filters were installed	Yes	45	29	61
	No	51	35	67
	Don't know	4 ^a	1	12
Drinking fountains (bubblers) or faucets were replaced	Yes	71	55	83
	No	26	14	43
	Don't know	3 ^a	0	9
Drinking fountains (bubblers) or faucets were taken out of service but not replaced	Yes	63	47	77
	No	35	21	52
	Don't know	2 ^a	0	8
Pipes were replaced	Yes	27	17	41
	No	68	55	80
	Don't know	4 ^a	1	12
Bottled water was provided or students were told to bring their own bottled water	Yes	37	23	54
	No	61	44	76
	Don't know	2 ^a	0	8
Some other action(s) was taken	Yes	27 ^a	15	44
	No	57	40	73
	Don't know	16 ^a	7	34

5D. If 'no' to every item in 5C: What are the reasons why your LEA has not taken actions in any of your schools in the past 12 months?

[open-ended]

5E. If 'yes' to any item in 5C: How much do you estimate your LEA has spent on taking actions in the past 12 months? (Please include materials, labor, and any other expenditures related to lead remediation in your estimate.)

Response	Estimated Number (Median)	95 percent confidence interval – lower bound (number)	95 percent confidence interval – upper bound (number)
(Respondent reported number)	5,108	2,452	7,251

5F. Did your LEA use any of the following sources of funding to take actions in the past 12 months? (Check one per row).

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)	
Your LEA	Yes	83	68	92
	No	14 ^a	6	30
	Don't know	3 ^a	0	11
State government agency	Yes	23 ^a	14	37
	No	72	58	83
	Don't know	5 ^a	1	13
Federal government agency	Yes	1 ^a	0	7
	No	92	83	97
	Don't know	6 ^a	2	16
Other	Yes	0 ^a	0	0
	No	92	82	97
	Don't know	8 ^a	3	18

If 'other' to 5F: What other sources of funding did your LEA use to take actions in the past 12 months?

[open-ended]

5G. Did your LEA notify the following groups about its actions in the past 12 months? (Check one per row).

Response		Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Local school board	Yes	82	68	91
	No	12	4	27
	Don't know	6 ^a	2	15
Parents	Yes	73	56	85
	No	15	7	31
	Don't know	12 ^a	4	29
General public (e.g., media)	Yes	68	51	81
	No	20	10	36
	Don't know	13 ^a	5	31
A state government agency	Yes	63	47	77
	No	24	14	40
	Don't know	13 ^a	5	30
Other	Not checked	86	81	90
	Yes	1 ^a	0	5
	No	9	6	13
	Don't know	4 ^a	2	8

If 'other' to 5G: What other groups has your LEA notified about its remedial actions in the past 12 months?

[open-ended]

6. Does your LEA have a schedule to flush the water system as a result of concerns about lead in drinking water in at least one of your schools within any of the following time frames? (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Yes, once a week or more frequently	1	0	3
Yes, once a month or more frequently, but not every week	1 ^a	0	3
Yes, once a year or more frequently, but not once a month	9	6	15
Yes, less frequently than once a year	1 ^a	0	3
Not now, but our LEA is developing a schedule	5 ^a	3	10
No	69	61	75
Don't know	13	9	20

7. Does your LEA have plans to take actions to eliminate or reduce lead in school drinking water (for example, replace drinking water fountains, replace pipes) in at least one of your schools? (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
As needed	40	33	47
According to a schedule	2 ^a	0	5
Not now, but our LEA is developing plans	1 ^a	0	3
No	47	40	55
Don't know	10	6	15

If 'according to a schedule' to 7: how would you describe the schedule that your LEA has developed?

[open-ended]

Section D: Guidance Regarding Lead Testing and Remediation

8. Prior to receiving this survey, were you familiar with guidance issued by the U.S. Environmental Protection Agency entitled “3Ts for Reducing Lead in Drinking Water in Schools”? (Please answer “Yes” if you had read or used the “3Ts” prior to receiving this survey.) (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Yes	34	28	42
No	60	53	67
Don't know	5 ^a	3	9

If ‘yes’ to 8: did your LEA (or a contractor working on behalf of your LEA) follow or refer to “3Ts” during your efforts to test for or remediate lead in school drinking water? (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Yes	58	45	70
No	8 ^a	4	18
Not applicable: our LEA neither tested for nor remediated lead	14 ^a	7	28
Don't know	20 ^a	11	32

If 'yes' to 8A: How helpful was 3Ts for conducting tests for lead in your schools' drinking water? (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Extremely helpful	19	11	31
Very helpful	49	33	64
Moderately helpful	8 ^a	4	16
Somewhat helpful	16 ^a	6	34
Not at all helpful	0 ^a	0	4
Don't know	8 ^a	4	18

If 'yes' to 8A: How helpful was 3Ts for remediating lead in your schools' drinking water? (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Extremely helpful	11 ^a	5	22
Very helpful	37	22	53
Moderately helpful	18	8	35
Somewhat helpful	17 ^a	7	34
Not at all helpful	3 ^a	0	9
Don't know	16 ^a	7	31

If 'yes' to 8A: How helpful was 3Ts for communicating with parents and other stakeholders about lead in your schools' drinking water? (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Extremely helpful	8 ^a	3	17
Very helpful	45	30	62
Moderately helpful	13 ^a	5	27
Somewhat helpful	16 ^a	7	34
Not at all helpful	3 ^a	0	11
Don't know	15 ^a	8	26

What else, if anything, would make 3Ts more helpful?

[open-ended]

9. Did your LEA (or a contractor working on behalf of your LEA) use any other guidance (for example, best practices, manuals, protocols, webinars) in your LEA’s efforts to test for lead in your schools’ drinking water, take remedial actions, or for notification purposes? (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Yes	17	12	23
No	42	34	49
Don’t know	41	34	49

What other guidance was used?

[open-ended]

10. Would your LEA find any of the following helpful? (Check one per row).

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)	
Clearer guidance on a level of lead in school drinking water at which we should take action	Extremely helpful	25	19	32
	Very helpful	31	25	39
	Moderately helpful	15	10	21
	Somewhat helpful	11	7	17
	Not at all helpful	7	4	12
	Don’t know	11	7	16
Additional guidance on determining a schedule for	Extremely helpful	21	16	28
	Very helpful	33	26	41

Appendix II: Survey of Lead Testing and Remediation Efforts

Response		Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
regularly testing for lead in school drinking water	Moderately helpful	17	12	23
	Somewhat helpful	11	7	17
	Not at all helpful	8	5	12
	Don't know	10	7	16
Additional guidance on actions to take if lead is found in school drinking water	Extremely helpful	31	24	38
	Very helpful	31	25	39
	Moderately helpful	15	10	21
	Somewhat helpful	7	4	12
	Not at all helpful	6	3	11
	Don't know	10	6	16
Information on the costs of testing for lead in school drinking water	Extremely helpful	24	18	31
	Very helpful	30	24	38
	Moderately helpful	16	11	23
	Somewhat helpful	11	7	17
	Not at all helpful	10	6	15
	Don't know	9	6	14
Information on the costs of remediating lead in school drinking water	Extremely helpful	25	19	32
	Very helpful	34	27	42
	Moderately helpful	17	12	23
	Somewhat helpful	8	5	13
	Not at all helpful	7	4	12
	Don't know	9	6	14
Other guidance or information	Extremely helpful	11	7	18

Appendix II: Survey of Lead Testing and Remediation Efforts

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Very helpful	9	6	15
Moderately helpful	10	6	16
Somewhat helpful	2 ^a	1	4
Not at all helpful	8	5	12
Don't know	60	52	68

If 'other guidance or information' to 10: What other guidance or information would be helpful?

[open-ended]

Section E: Inspecting Schools for Lead Based Paint³

Section F: Remediation of Lead Based Paint in Schools

Section G: Other Questions

16. How many schools are owned or operated by your LEA?

Response	Estimated Number (Mean)	95 percent confidence interval – lower bound (number)	95 percent confidence interval – upper bound (number)
(Respondent reported number)	7.29	6.20	8.39

³ Information from the survey regarding lead-based paint may be included in a future report.

17. How many schools in your LEA were built before 1986? (If a building has additions, we mean the original structure/the original part of the building.)

Response	Estimated Number (Mean)	95 percent confidence interval – lower bound (number)	95 percent confidence interval – upper bound (number)
(Respondent reported number)	8.34	1.63	15.05

18. How many schools in your LEA were built before 1978? (If a building has additions, we mean the original structure/the original part of the building.)

Response	Estimated Number (Mean)	95 percent confidence interval – lower bound (number)	95 percent confidence interval – upper bound (number)
(Respondent reported number)	4.39	3.63	5.16

19. Is there anything else you would like to share with us regarding lead testing, inspection, or remediation efforts in your school or LEA (drinking water or paint)?

[open-ended]

20. What is the name, title, e-mail address, and telephone number of the person responsible for completing this survey?

[open-ended]

Section H: Completion

21. Please check one of the options below. Clicking on “Completed” indicates that your answers are official and final. Your answers will not be used unless you have done this. (Check one.)

Response	Estimated Percentage	95 percent confidence interval – lower bound (percentage)	95 percent confidence interval – upper bound (percentage)
Completed	67	62	72
Not completed	33	28	38

Appendix III: Lead Testing and Remediation in Charter School Districts

Charter schools comprise a small but growing group of public schools. In contrast to most traditional public schools, many charter schools are responsible for financing their own buildings and other facilities. As a result, charter schools vary in terms of whether they own their own building or pay rent, and whether they operate in buildings originally designed as a school or in buildings which have been redesigned for educational purposes. Sometimes charter schools may also share space in their building with others, such as non-profit organizations. In addition to differences in facility access and finance, charter school governance also varies. In some states, charter schools function as their own school district, while in other states, charter schools have the option to choose between being a distinct school district or part of a larger school district.

To determine the extent to which charter school districts were testing for lead in school drinking water and finding and remediating lead, our survey included charter school districts in two ways: our sampling design included three strata specifically for charter school districts in urban areas; in addition, charter school districts were retained in the sampling population, such that they could be randomly selected in our other strata.¹ While we generally received too few responses from charter school districts to report their data separately, we are able to estimate that about 36 percent of charter school districts tested for lead in school drinking water.²

To learn more about experiences of charter schools, we visited one charter school district and interviewed representatives of the DC Public Charter School Board (DC PCSB).

- The charter school district we visited consisted of one charter school in a building it leased. The school had 10 sources of consumable water, all of which were tested in 2016 and were found to have lead below the district's selected action level of 15 parts per billion. Before testing, district officials met with the building owner who agreed to cover the cost of any remediation.

¹In addition, we interviewed officials with the National Alliance for Public Charter Schools as we were developing our survey and pre-tested our survey with a charter school district.

²Our survey was administered from July to October 2017 and asked school districts to report information based on the 12 months prior to their completing the survey. The margin of error for this estimate is plus 13 or minus 11 percentage points.

- Officials with the DC PCSB told us that it paid to have tests conducted in every charter school in the District of Columbia. According to DC PCSB officials, between March and June 2016, 95 charter schools were tested, and lead above their action level of 15 parts per billion was discovered in 20 schools. Officials estimated their testing costs to be about \$100,000, which was subsequently reimbursed by the District of Columbia's Office of State Superintendent of Education. They also said that charter schools were responsible for taking steps to remediate the lead and recommended schools flush their water systems and use filters.

Appendix IV: Testing Components for Eight States That Require School Districts to Test for Lead in Drinking Water

Table 5: Testing Components for Eight States That Require School Districts to Test for Lead in Drinking Water

State	Applicable schools	Action level and sample size	Sources or samples tested	Frequency of testing	Responsibility for costs		
					Testing	Remediation	Communication of results
California	All public schools constructed before 2010	15 ppb in a 1 liter sample	1 to 5 samples per school recommended	Once before July 2019	Water Systems	Schools	Must notify families of results above the action level
Illinois	All elementary schools, including private elementary schools, constructed before 2000	Any positive result in 250 ml sample	All drinking water sources in each school	Not specified	School Districts	School Districts	All test results must be made public or provided to families and must notify families of results above 5 ppb
Maryland	All public and private schools	20 ppb in a 250 ml sample	All drinking water sources in each school	Every 3 years	School Districts	School Districts	Must notify families and multiple agencies of results above the action level
Minnesota	All public schools	Different actions recommended at 2 ppb and 20 ppb in a 250 ml sample	All drinking water sources in each school	By July 2018 and then every 5 years	School ^a	School ^a	Must make all test results public
New Jersey	All public schools; selected additional schools that receive public funds. ^b	15 ppb in 250 ml sample	All drinking water sources in each school	By July 2017 and then every 6 years	State and School Districts	School Districts	Must make all test results public and must notify families of results above the action level
New York	All public schools, not including charter schools	15 ppb in 250 ml sample	All drinking water sources in each school	By October 2016 and then every 5 years, or at earlier intervals as determined by the Health Department Commissioner	State and School Districts ^c	State and School Districts ^c	Must notify families and the local health department of all test results

Appendix IV: Testing Components for Eight States That Require School Districts to Test for Lead in Drinking Water

State	Applicable schools	Action level and sample size	Sources or samples tested	Frequency of testing	Responsibility for costs		
					Testing	Remediation	Communication of results
Virginia	All public schools; priority to schools built before 1986	Not specified	High priority drinking water sources such as water fountains	Not specified	School Districts	School Districts	Not specified
District of Columbia	All public schools	5 ppb in a 250 ml sample (from filtered fixture)	All drinking water sources in each school	Annually	State, except in the case of charter schools ^d	State, except in the case of charter schools ^d	Must make all test results public

Source: GAO summary of selected state requirements to test for lead in school drinking water, as confirmed by state officials. | GAO-18-382

Notes: These are examples of states that had requirements according to EPA as of September 2017. To compile the information in this table, we reviewed state laws, regulations, and policy documents. We also included information provided to us by state officials. We confirmed this information with state officials and it is current as of April 2018. EPA stated there may be more states with requirements, as EPA does not track state testing programs. For convenience, we have included the District of Columbia in our counts of states. Unless otherwise noted, charter schools are included as public schools.

^aState funds are available for reimbursement if requested.

^bAdditional schools that receive state funding include approved private schools for students with disabilities that provide educational services on behalf of New Jersey public school districts.

^cNew York state law provides funding to reimburse school districts for testing and remediation costs incurred prior to July 2019.

^dCharter schools in the District of Columbia receive an annual facilities maintenance budget which can be used to pay for lead testing and remediation.

Appendix V: EPA Guidance to the Public on Reducing Lead in Drinking Water

The Environmental Protection Agency (EPA) provides information on its website for the public on lead in drinking water. EPA's website includes, among other documents, a December 2005 brochure for the public and school districts entitled "3Ts for Reducing Lead in Drinking Water in Schools" (see fig. 10).¹

¹Environmental Protection Agency, *3Ts for Reducing Lead in Drinking Water in Schools*, accessed March 30, 2018, <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=20017JM2.txt>.

Figure 10: Example of Information about Lead in School Drinking Water for the Public from the Environmental Protection Agency's Website

3Ts for Reducing Lead in Drinking Water in Schools

Nearly 56 million Americans, including 53 million children, spend their days in schools. School officials need to know if the drinking water students, teachers, and staff consume contains elevated levels of lead because exposure to lead can cause serious health problems, particularly for young children. To help schools safeguard their occupants' health, the U.S. Environmental Protection Agency (EPA) developed the *3Ts for Reducing Lead in Drinking Water in Schools: Revised Technical Guidance*. It provides the information schools need to:

- ▶ Identify potential sources of lead in their facilities,
- ▶ Monitor school drinking water for elevated lead levels,
- ▶ Resolve problems if elevated lead levels are found, and
- ▶ Communicate about their lead control programs.

Although public water systems that supply water to most schools may meet EPA's lead standards, lead can still get into school drinking water. As water moves through a school's plumbing system, lead can leach into the drinking water from plumbing materials and fixtures that contain lead. Testing is the best way for schools to know if there are elevated levels of lead in a facility's drinking water.


Ensuring that the water provided in your school is safe for children to drink is a fundamental responsibility. In addition to the health advantages, schools that voluntarily test drinking water and make information about their program available to the public will enjoy the following benefits:

- ▶ Enhanced credibility
- ▶ Positive publicity
- ▶ Parental and community support
- ▶ Stature as a standard-setting "best practices" facility

Health Effects of Exposure to Lead

Infants and children exposed to lead can experience:

- ▶ Delays in physical and mental development
- ▶ Lower IQ levels
- ▶ Reduced attention span
- ▶ Learning disabilities
- ▶ Hearing loss
- ▶ Hyperactivity
- ▶ Poor classroom performance



3Ts of Reducing Lead in Drinking Water in Schools

EPA developed the 3Ts (Training, Testing, and Telling) to help schools implement simple strategies for managing the health risks of lead in school drinking water.

- ▶ **Training** school officials to raise awareness of the potential occurrences, causes, and health effects of lead in drinking water; assist school officials in identifying potential areas where elevated lead may occur; and establish a testing plan to identify and prioritize testing sites.
- ▶ **Testing** drinking water in schools to identify potential problems and take corrective actions as necessary.
- ▶ **Telling** students, parents, staff, and the larger community about monitoring programs, potential risks, the results of testing, and remediation actions.

DOWNLOAD The *3Ts For Reducing Lead In Drinking Water In Schools: Revised Technical Guidance* at no cost by visiting www.epa.gov/safewater/schools or order a free copy by calling the Safe Drinking Water Hotline at 1-800-426-4791.

Source: Environmental Protection Agency. | GAO-18-382



Sources of Lead Exposure

Lead is distributed in the environment by natural and human-made activity. (Past human activities are the major source of lead in the environment.)

Possible sources of lead include:

- ▶ **Lead-based paint** that can flake off into soil, window sills, or floors
- ▶ **Lead in the air** from industrial activities
- ▶ **Dust and soil** from roadways and streets where automobiles, which used leaded gas, travelled
- ▶ **Lead dust** brought home by industrial workers on their clothes and shoes
- ▶ **Lead in water** from the corrosion of plumbing products containing lead

Although most lead exposure occurs when people eat paint chips and inhale dust, EPA estimates that 10 to 20 percent of human exposure to lead may come from lead in drinking water.

Potential Sources of Lead In Drinking Water

- ▶ Lead solder
- ▶ Lead pipe and pipe fittings
- ▶ Fixtures, valves, meters and other system components containing brass
- ▶ Sediments

Start Your Lead in Drinking Water Control Program Today

The first step to implementing a successful lead control program is to read the recommendations found in the *3Ts for Reducing Lead in Drinking Water in Schools: Revised Technical Guidance*. Schools can follow the straightforward guidance found in the 3Ts to:

- ▶ **Collect information on school drinking water and identify assistance to help implement a school lead control program.** The 3Ts provides tips on finding past testing results; asking water utilities for help or financial assistance; reaching out to state drinking water programs for support; and evaluating existing resources.
- ▶ **Develop a plumbing profile.** A plumbing profile helps schools identify potential problem areas and assess factors that contribute to lead problems. Lead contamination may not occur uniformly throughout a building and the 3Ts describes various factors that affect the likelihood of lead contamination in order to identify those areas as priorities for testing. Chapter 3 of the guidance provides tips on developing a school plumbing profile.
- ▶ **Develop a drinking water testing plan.** The results of a plumbing profile will help schools create their testing plans. Key issues to consider include who will be in charge of the effort; who will collect and analyze the samples and maintain records; and where samples will be taken. Chapter 3 of the guidance helps schools answer these questions and suggests possible sources of assistance for school testing efforts.
- ▶ **Test the facilities' drinking water for lead.** EPA recommends a two-step sampling process to test for lead in drinking water. The two-staged process will help schools determine if particular outlets have elevated lead levels **and** locate the source of the problem. The recommended testing plan allows schools to determine if the source of lead is at the sampled outlet or within the facility's interior plumbing. Schools will find detailed and easy-to-follow instructions on testing for lead in water in Chapter 4.
- ▶ **Correct problems when elevated lead levels are found.** Addressing elevated lead levels in school drinking water typically requires temporary and permanent solutions. Chapter 5 recommends short-term solutions to reduce the risk of exposure to lead in drinking water in schools and provides suggestions for permanent solutions, such as replacing pipes, fixtures, or faucets containing lead with lead-free alternatives.
- ▶ **Communicate with the school community about a school lead control program.** Lead is a serious public health risk and monitoring school drinking water for lead is one important way schools can protect their community's health. Schools will benefit if they communicate about their lead monitoring program with students, teachers, staff, parents, and other members of the school community. Chapter 6 of the guidance provides communication strategies and sample materials schools can use.



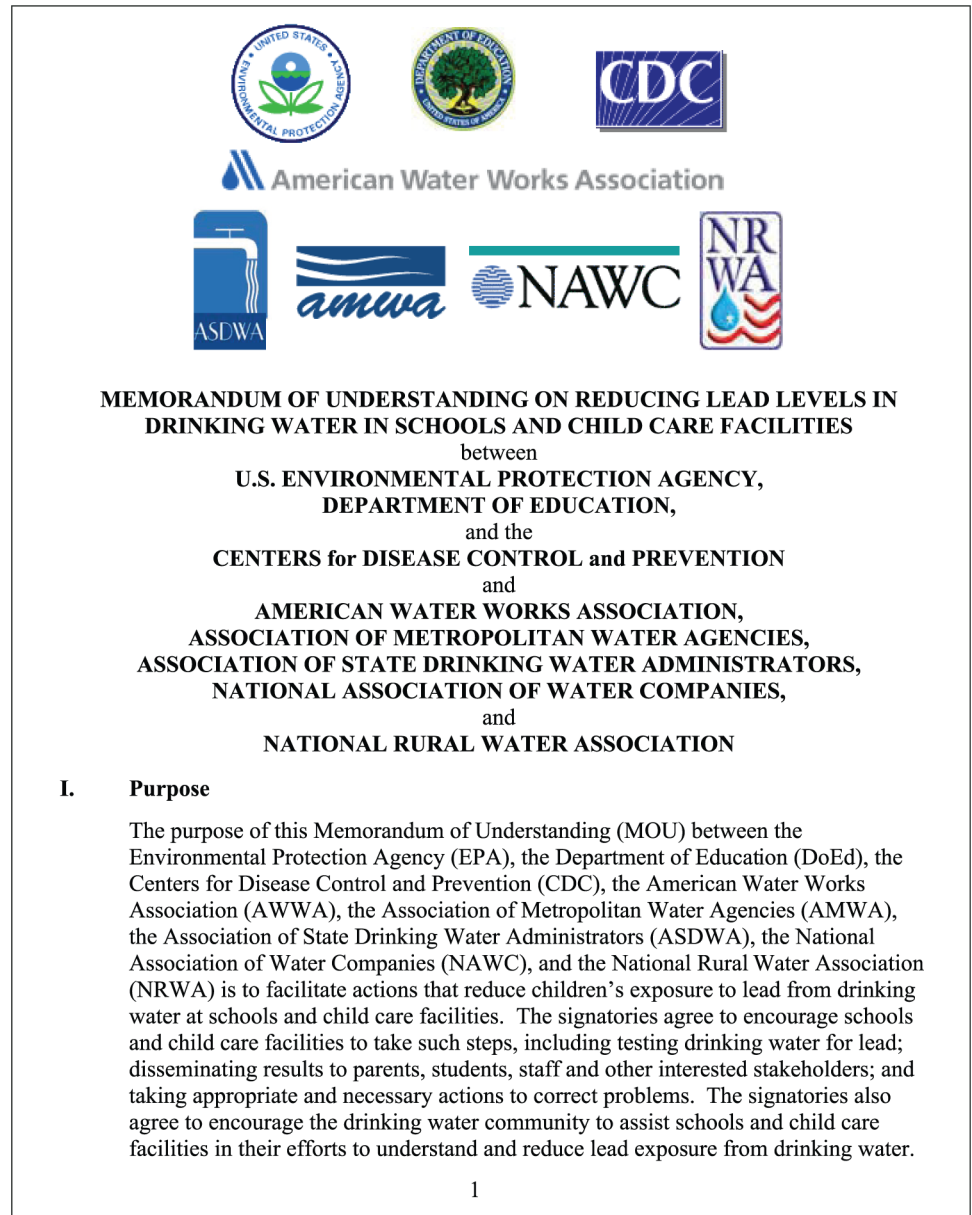
EPA 816-B-05-009
December 2005
Office of Water (4606)

DOWNLOAD The *3Ts For Reducing Lead In Drinking Water In Schools: Revised Technical Guidance* at no cost by visiting www.epa.gov/safewater/schools or order a free copy by calling the Safe Drinking Water Hotline at 1-800-426-4791.

Source: Environmental Protection Agency. | GAO-18-382

Appendix VI: Memorandum of Understanding between EPA, Education, CDC, and Related Associations on Reducing Lead in School Drinking Water Effective June 2005

Figure 11: Memorandum of Understanding between EPA, Education, CDC, and Related Associations on Reducing Lead in School Drinking Water Effective June 2005



II. Background

Exposure to lead is a significant health concern, particularly for young children and infants. Adverse health effects from lead in children can include impaired mental development. While we have made significant progress in reducing lead in the environment from all sources, including the nation's drinking water, our work is not finished. All parties to this agreement believe that we should "get the lead out" of drinking water to the extent possible. Since children spend a significant part of the day in school and child care facilities, understanding and reducing lead exposures in those facilities is particularly important.

In general, lead levels for water leaving the drinking water treatment plant are very low. However, lead leaches from plumbing materials and fixtures as water moves through the distribution system and through the customer's plumbing. Because lead concentrations can change as water moves through the distribution system, the best way to know if a school or child care facility might have high levels of lead in its drinking water is by testing the water in that school or child care facility. Testing facilitates an evaluation of the plumbing and helps target remediation. It is a key first step in understanding the problem, if there is one, and designing an appropriate response.

A collaborative effort by the EPA, drinking water associations, state primacy agency associations, the Centers for Disease Control and Prevention, and the Department of Education will provide a valuable impetus to building awareness of this issue at the community level. Such collaboration affords this effort important synergies. State health and environmental agencies can raise the issue of lead in drinking water in schools and child care facilities in the context of a broader effort. The drinking water community can provide valuable expertise to schools and child care facilities. The Department of Education can provide information and guidance to schools about lead in drinking water. EPA can work jointly with all parties to ensure that schools and childcare facilities are providing safe drinking water.

III. Agreement

a. Environmental Protection Agency

- i. EPA intends to update the 1994 guidance "Lead in Drinking Water in Schools and Non-Residential Buildings."
- ii. EPA intends to update the 1994 guidance "Sampling for Lead in Drinking Water in Nursery Schools and Day Care Facilities."
- iii. EPA intends to create guidance for the Implementation of the Lead and Copper Rule for schools and child care facilities that are regulated as public water systems under the Safe Drinking Water Act.

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- iv. **EPA** is planning to raise awareness and to provide tools and guidance on the issue of lead in drinking water in schools and child care facilities.
- v. **EPA** will seek to integrate water issues into a holistic healthy schools program that provides an overall context for each aspect of providing a safe learning environment for children.
- vi. **EPA** is planning to develop training tools for system owners and operators at schools and child care facilities that are regulated as a public water system.

b. Department of Education

- i. **DoEd** will identify the appropriate school associations and organizations to work with to craft appropriate messages and to facilitate dissemination of materials and tools to schools.
- ii. **DoEd** will work with EPA to disseminate materials and tools to schools.
- iii. **DoEd**, in collaboration with AMWA, ASDWA, AWWA, NAWC, NRWA and CDC will cooperate with EPA in the development of materials and tools to assist schools and child care centers in reducing lead in drinking water.

c. Centers for Disease Control and Prevention

- i. **CDC** will identify the appropriate public health organizations to work with to craft appropriate messages and to facilitate dissemination of materials and tools to child care centers.
- ii. **CDC** will work with EPA to disseminate materials and tools to state health departments.
- iii. **CDC**, in collaboration with DoED, AMWA, ASDWA, AWWA, NAWC, and NRWA will cooperate with EPA in the development of materials and tools to assist schools and child care centers in reducing lead in drinking water.

d. American Water Works Association

- i. **AWWA** will encourage its member utilities to educate schools and child care facilities they serve with respect to 1) testing for lead in drinking water and 2) developing strategies to communicate results.
- ii. **AWWA** will provide information to assist utilities to interact effectively with schools and child care facilities.
- iii. **AWWA** will encourage member utilities to coordinate with schools and child care facilities and provide available information on lead (including sources of lead) in drinking water in the community.
- iv. **AWWA**, in collaboration with AMWA, ASDWA, NRWA, NAWC, CDC and DoEd, will work together with EPA in the development of materials

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and tools to assist schools and child care centers in reducing lead in drinking water.

e. Association of Metropolitan Water Agencies

- i. **AMWA** will encourage its member utilities to work together with the schools and child care facilities they serve with testing for lead in drinking water and developing strategies to communicate results.
- ii. **AMWA** will encourage member utilities to offer technical support to schools and child care facilities they serve, to the extent they are able.
- iii. **AMWA**, in collaboration with **ASDWA**, **AWWA**, **NRWA**, **NAWC**, **CDC** and **DoEd**, will work together with **EPA** in the development of materials and tools to assist schools and child care centers in reducing lead in drinking water.

f. Association of State Drinking Water Administrators

- i. **ASDWA** will work with state primacy agencies in their efforts to provide appropriate levels of compliance assistance to schools and child care facilities that are public water systems to help ensure effective implementation of the Lead and Copper Rule (LCR).
- ii. **ASDWA**, working through state drinking program administrators, will assist in the dissemination of materials and tools to schools and child care facilities that are regulated as a public water system in order to improve implementation of the Lead and Copper Rule (LCR).
- iii. **ASDWA** will cooperate with **EPA** in the development of materials and tools to assist schools and child care centers in reducing lead in drinking water and will help coordinate state input and review of these materials and tools.

g. National Association of Water Companies

- i. **NAWC** will encourage its member utilities to educate schools and child care facilities they serve with respect to 1) testing for lead in drinking water and 2) developing strategies to communicate results.
- ii. **NAWC** will encourage member utilities to offer advice to schools and child care facilities they serve, consistent with the limits of the utility's expertise and resources.
- iii. **NAWC**, in collaboration with **AMWA**, **ASDWA**, **AWWA**, **NRWA**, **CDC** and **DoEd**, will work together with **EPA** in the development of materials and tools to assist schools and child care centers in reducing lead in drinking water.

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h. National Rural Water Association

- i. **NRWA** will make available its field expertise and on-site assistance as requested by utilities and as is practical to assist in the education, identification and remediation of lead in schools and child care centers.
- ii. **NRWA** will disseminate available educational material to its state affiliates for use in training and on-site assistance to public water supplies.
- iii. **NRWA** will publicize the EPA efforts to raise awareness of lead in drinking water in schools and child care facilities through its web sites and publications.

i. Joint Activities

- i. All parties will work to ensure that children in schools and child care facilities are provided with safe drinking water.
- ii. **EPA and AWWA** will jointly provide web cast or other appropriate training for drinking water utilities on the types of assistance utilities can provide to schools and child care facilities that wish to implement programs or policies to address lead in their drinking water.

IV. Limitations

- a. All commitments made in this agreement are subject to the availability of appropriated funds and each agency's budget priorities. Nothing in this MOU shall, in and of itself, obligate EPA, AWWA, AMWA, ASDWA, NACW, NRWA, the Department of Education, or the Centers for Disease Control and Prevention to expend appropriations or to enter into any contract, assistance agreement, interagency agreement or other financial obligations.
- b. This MOU does not impose requirements on schools, child care facilities, or water utilities beyond those contained in existing laws and regulation.
- c. Any endeavor involving the transfer of funds between the parties to the MOU will be executed in separate agreements between or among the participating parties. The signatories agree that they will not submit a claim for compensation to EPA for any actions taken in furtherance of this MOU.
- d. This MOU is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between the parties to this MOU will be handled in accordance with applicable laws, regulations and procedures, and will be subject to separate subsidiary agreements that shall be effected in writing by representatives of both parties.
- e. This MOU in no way restricts the signatories from participating in similar activities or arrangements with other entities or federal agencies.

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- f. None of the Federal signatories may endorse the purchase or sale of products and services provided by private organizations that become partners in this effort.
- g. This MOU does not create any right or benefit, substantive or procedural, enforceable by law or equity against the signatories of the MOU, their officers or employees, or any other person. This MOU does not direct or apply to any person outside the signatories to the document.

V. Effective date

This MOU will become effective upon signature by the Assistant Administrator for Water of the U.S. Environmental Protection Agency, the Assistant Deputy Secretary for the Office of Safe and Drug Free Schools of the U.S. Department of Education, the Acting Director of the National Center for Environmental Health/Agency for Toxic Substances and Disease Registry of the Centers for Disease Control and Prevention, the Executive Director of the American Water Works Association, the Executive Director of the Association of Metropolitan Water Agencies, the Executive Director of the Association of State Drinking Water Administrators, the Executive Director of the National Association of Water Companies, and the Executive Director of the National Rural Water Association, and shall remain in effect until termination by any Party. Any Party may withdraw from the agreement by giving notice to the other parties in writing. Its provisions will be reviewed annually and amended or supplemented as may be mutually agreed upon in writing. This MOU becomes effective on the date of the final signature.

Appendix VII: Comments from the Environmental Protection Agency



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

JUN 18 2018

Mr. Alfredo Gomez
Director
Natural Resources and Environment
U.S. Government Accountability Office
Washington, DC 20548

OFFICE OF WATER

Dear Mr. Gomez:

Thank you for the opportunity to review and comment on the Government Accountability Office's Draft Report (GAO 18-382), *K-12 Education: Lead Testing of School Drinking Water Would Benefit from Improved Federal Guidance*. The purpose of this letter is to provide the U.S. Environmental Protection Agency's (EPA) response to your findings, conclusions, and recommendations.

In the draft report, the GAO examines the extent to which (1) school districts are testing for, finding, and remediating lead in drinking water; (2) states are supporting these efforts; and (3) federal agencies are supporting state and school district efforts. The EPA generally agrees with the GAO's findings, conclusions, and recommendations.

The EPA agrees that internal collaboration between the EPA's Office of Water and Office of Children's Health Protection, and increased coordination between the EPA and the U.S. Department of Education, could improve school districts' awareness of resources on lead in drinking water. The EPA will continue to provide training, technical assistance, and up-to-date information to better assist schools and childcare facilities in their efforts to reduce lead in drinking water. The enclosure to this response notes clarifications and technical corrections for your consideration.

GAO Recommendations and the EPA Responses:

The Assistant Administrator for Water of EPA's Office of Water should promote further efforts to communicate the importance of testing for lead in school drinking water to address what has been a varied approach by regional offices. For example, the Assistant Administrator could direct those offices with limited involvement to build on the recent efforts of several regional offices to provide technical assistance and guidance, and other forms of support. (Recommendation 1)

The EPA agrees with this recommendation. The Office of Ground Water and Drinking Water holds regular meetings with EPA's regional offices on drinking water in schools and will continue this collaboration. The EPA will also use implementation of the new congressional appropriation for lead testing in schools as a means to improve consistency in the EPA's approach.

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The Assistant Administrator for Water of EPA's Office of Water should provide interim or updated guidance to help schools choose an action level for lead remediation and more clearly explain that the action level currently described in the 3Ts guidance is not a health-based standard. (Recommendation 2)

The EPA agrees with this recommendation. The EPA's Office of Ground Water and Drinking Water is holding regular meetings with regional offices, the Office of Research and Development, and the Office of Children's Health Protection to obtain input on improvements to the EPA's *Training, Testing and Telling for Reducing Lead in Drinking Water in Schools* (3Ts) guidance. Potential revisions include updates to implementation practices, the sampling protocol, and the remediation trigger, including clarifying descriptions of different action levels and standards.

The Assistant Administrator for Water of EPA's Office of Water should, following the agency's revisions to the LCR, consider whether to develop a health-based level for school districts that incorporates available scientific modeling regarding vulnerable population exposures and is consistent with the LCR. (Recommendation 3).

The EPA generally agrees with this recommendation. While the EPA has not yet determined the specific role of a health-based benchmark for lead in drinking water in the revised Lead and Copper Rule (LCR), the Agency sees value in providing states, drinking water systems and the public with a greater understanding of the potential health implications for vulnerable populations of specific levels of lead in drinking water. The EPA recognizes that states and local districts may set lower trigger levels as a part of their efforts to further protect children from lead exposure. The objective of revising the 3Ts guidance is to provide an up-to-date and informative toolkit to better assist schools and childcare facilities in their efforts to reduce exposure to lead in drinking water.

The Assistant Administrator for Water of EPA's Office of Water should provide information to states and school districts concerning schedules for testing school drinking water for lead, actions to take if lead is found in the drinking water, and costs of testing and remediation. (Recommendation 4)

The EPA agrees with this recommendation. The EPA will continue to reach out to states and schools to provide information, technical assistance, and training and will continue to make the 3Ts guidance available.

The EPA's Office of Water and Office of Children's Health Protection are currently collaborating to develop additional resources for schools including a website to support EPA's 3Ts guidance and case studies of school districts that have tested for lead. The EPA will work with the Department of Education to ensure that school districts and other stakeholders are aware of this resource.

The Assistant Administrator for Water of EPA's Office of Water and the Director of the Office of Children's Health Protection should collaborate with Education to encourage testing for lead in school drinking water. This effort could include further dissemination of EPA guidance related to lead testing and remediation in schools or sending letters to states to encourage testing in all school districts that have not yet done so. (Recommendation 6)

**Appendix VII: Comments from the
Environmental Protection Agency**

The EPA agrees with this recommendation. Increased collaboration between the EPA's Office of Water and Office of Children's Health Protection, and between the EPA and the U.S. Department of Education, could improve school districts' awareness of resources on lead in drinking water. The EPA will continue to provide training and up-to-date information to better assist schools and childcare facilities in their efforts to reduce lead in drinking water, including schedules for testing and actions to take if lead is found.

Thank you for the opportunity to review the draft report. The EPA looks forward to continuing to work with GAO to improve the implementation of lead testing in schools and child care facilities programs. If you have any questions, please contact Peter Grevatt, Director of the Office of Ground Water and Drinking Water at (202) 564-3750.

Sincerely,



David P. Ross
Assistant Administrator

Enclosure

cc: EPA GAO Liaison Team

Appendix VIII: Comments from the Department of Education



UNITED STATES DEPARTMENT OF EDUCATION
OFFICE OF ELEMENTARY AND SECONDARY EDUCATION
WASHINGTON, D.C. 20202
THE ASSISTANT SECRETARY

JUN 4 2018

Ms. Jacqueline M. Nowicki
Director
Education, Workforce, and Income Security Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Nowicki:

I am writing in response to the recommendations made in the U.S. Government Accountability Office (GAO) draft report, "K-12 Education: Lead Testing of School Drinking Water Would Benefit from Improved Federal Guidance" (GAO-18-382). I appreciate the opportunity to comment on the draft report on behalf of the U.S. Department of Education (Department).

The Department recognizes the importance of testing for lead in school drinking water. In April 2017, the Department initiated the interagency coordination group, the Federal Partners for School Health, to coordinate with the Environmental Protection Agency (EPA) and other Federal agencies to assist states and school districts with their efforts to support the health of students and promote healthy school environments. Following the Flint, Michigan crisis, the Department provided \$480,000 in Project SERV grant funds to Flint Community Schools "to restore the learning environment following the water crisis that began in 2014 that left residents with lead-contaminated drinking water." The Department also worked directly with the Centers for Disease Control (CDC) to help CDC issue its FAQ guidance in March 2016. See <https://rems.ed.gov/docs/03-07-16-FlintFAQ.pdf>.

Although Congress does not provide Federal funds to the Department to be used for the purpose of testing school drinking water, the Department is committed to providing information about Federal resources to promote healthy school environments.

We appreciate GAO's review of this issue. The draft report makes two recommendations to the Department, and we provide our response to the recommendations below:

Recommendation: The Assistant Secretary for Elementary and Secondary Education should improve the usability of Education's websites to ensure that the states and school districts can more easily find and access federal guidance to address lead in

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The Department of Education's mission is to promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access.

school drinking water, by taking actions such as clarifying which links contain guidance; highlighting new or important guidance; improving their websites' search function; and categorizing guidance. (Recommendation 5)

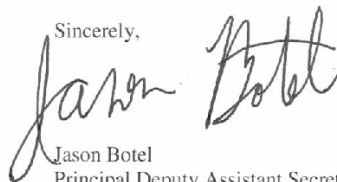
Response: The Department concurs with this recommendation and believes that Federal resources should be easily accessible by State educational agencies (SEAs) and local educational agencies (LEAs) to assist in testing for and addressing lead in school drinking water. To that end, the Department will identify and include an appropriate, thorough and concise portal of information that will be dedicated to enhancing the usability of Federal resources related to testing for and addressing lead in school drinking water.

Recommendation: The Assistant Secretary for Elementary and Secondary Education should collaborate with EPA to encourage testing for lead in school drinking water. This effort could include disseminating EPA guidance related to lead testing and remediation in schools or sending letters to states to encourage testing in all school districts that have not yet done so. (Recommendation 7)

Response: The Department concurs with this recommendation. We are always interested in improving coordination across all levels of government, and we share the view outlined in the report that improved Federal coordination, particularly with EPA, will better enhance collaboration to encourage testing for lead in school drinking water. The Department will develop a plan for disseminating relevant resources to our key stakeholder groups and explore how to best coordinate with SEAs to disseminate to LEAs EPA guidance related to lead testing and remediation.

We appreciate the opportunity to review the draft report and comment on the recommendations. We do not have technical comments.

Sincerely,



Jason Botel
Principal Deputy Assistant Secretary,
Delegated the Authority to Perform the Functions and
Duties of the Position of Assistant Secretary,
Office of Elementary and Secondary Education

Appendix IX: GAO Contacts and Staff Acknowledgments

GAO Contacts

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Staff Acknowledgments

In addition to the individuals named above, Diane Raynes (Assistant Director), Scott Spicer (Assistant Director), Jason Palmer (Analyst-in-Charge), Amanda K. Goolden, Rich Johnson, Grant Mallie, Jean McSween, Dae Park, James Rebbe, Sarah M. Sheehan, and Alexandra Squitieri made significant contributions to this report. Also contributing to this report were Susan Aschoff, David Blanding, Mimi Nguyen, Tahra Nichols, Dan C. Royer, Kiki Theodoropoulos, and Kim Yamane.

Related GAO Products

Lead Paint in Housing: HUD Should Strengthen Grant Processes, Compliance Monitoring, and Performance Assessment. [GAO-18-394](#). Washington, D.C.: June 19, 2018.

Drinking Water: Additional Data and Statistical Analysis May Enhance EPA's Oversight of the Lead and Copper Rule. [GAO-17-424](#). Washington, D.C.: September 1, 2017.

Environmental Health: EPA Has Made Substantial Progress but Could Improve Processes for Considering Children's Health. [GAO-13-254](#). Washington, D.C.: August 12, 2013.

Lead in Tap Water: CDC Public Health Communications Need Improvement. [GAO-11-279](#). Washington, D.C.: March 14, 2011.

Environmental Health: High-level Strategy and Leadership Needed to Continue Progress toward Protecting Children from Environmental Threats. [GAO-10-205](#). Washington, D.C.: January 28, 2010.

Drinking Water: EPA Should Strengthen Ongoing Efforts to Ensure That Consumers Are Protected from Lead Contamination. [GAO-06-148](#). Washington, D.C.: January 4, 2006.

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