Alabama Rivers Alliance

LEAD SERVICE LINE REPLACEMENT IN ALABAMA

Existing Policies, Barriers, and Recommendations

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Executive Summary

There has never been a better time for Alabama to finally take the steps to replacing all existing lead pipes in the state. With the requirements of the forthcoming 2024 Lead and Copper Rule Revisions and financial assistance of the Bipartisan Infrastructure Law, states have both the obligation and an enhanced ability to replace lead service lines. Alabama's statutory and regulatory frameworks meet federal minimums, but those requirements are intended to be a floor, not a ceiling. There is no safe level of lead exposure. Lead service lines are the primary source of lead in drinking water. Incidents like the Flint water crisis demonstrate that existing corrosion control practices are not permanent solutions to protecting communities from lead exposure. Alabama should implement policies that prioritize lead service line replacement over continuous corrosion control treatment, replace private side of lines at no cost to the consumer, and require disclosure of pipe material make-up at the time of property sale or transfer.

Issue Background

Lead Service Lines – History and Health Implications

During the early 20th century, large numbers of lead service lines were installed throughout the United States.[1] Service lines carry water from larger pipes in a utility's distribution system (commonly referred to as "water mains") into homes and businesses. Despite concerns about the negative impacts of lead on human health, and the element's known neurological and developmental toxicity, over 85% of large American cities had service lines containing lead in 1900.[2] In 1986, Congress amended the Safe Drinking Water Act ("SDWA"; 42 U.S.C. § 300f *et seq.*) to prohibit the use of lead pipes, solder, and flux in most drinking water applications.[3] The number of lead pipes and fixtures used in drinking water systems prior to the 1986 ban is ultimately unknown.[4]

No authoritative medical source has been able to establish a safe level of lead in blood. While the amount of lead sources resulting in toxic exposure has been reduced, the neurotoxic metal is still present in some lead pipes and plumbing fixtures installed prior to the 1986 ban. Low-level lead exposure in children can cause intellectual deficiencies, hyperactivity, hearing loss, problems with balance, and other neurological and cognitive impairments.[5] Chronic lead exposure can cause anemia, gastrointestinal dysfunction, and

[1] Rabin, "The Lead Industry and Lead Water Pipes 'A MODEST CAMPAIGN.'"
[2] Troesken, *The Great Lead Water Pipe Disaster*.
[3] 42 U.S.C. § 300g-6(a)(1)(A).
[4] Olson and Stubblefield, "Lead Pipes Are Widespread and Used in Every State."
[5] Patrick, "Lead Toxicity, A Review of the Literature. Part I."

nerve damage in the extremities in both children and adults.[6] Acute lead toxicity can lead to encephalopathy, a debilitating and sometimes fatal decline of brain function. This condition normally occurs at blood levels of 100 micrograms per deciliter in adults and 80 micrograms per deciliter in children.[7] The CDC currently uses 3.5 micrograms per deciliter of lead in blood as the threshold for intervention in children.[8] However, this is not a regulatory standard but rather a threshold for further investigation of the methods of lead exposure and education for parents or caretakers about how to reduce lead exposure. In Alabama, the Department of Public Health provides intervention services, including health education, case management, and environmental surveys to identify sources of lead exposure in the home, to the families of any child with a blood lead value of 3.5 micrograms per deciliter or higher.[9] Nevertheless, studies have shown that even lower levels of lead in blood can result in intellectual deficits in children.[10] Because there is no safe level of lead exposure, the EPA has set the maximum contaminant level goal of lead in drinking water at 0.[11]

EPA Lead and Copper Rule Revisions (2021)

In 2021, the Environmental Protection Agency published its initial revision of the National Primary Drinking Water Regulations (NPDWR) for lead and copper, commonly

[6] Philip and Gerson, "Lead Poisoning-Part II."

[7] Vorvolakos, Arseniou, and Samakouri, "There Is No Safe Threshold for Lead Exposure."

[8] CDC, "About the Data."

[9] ADPH, "Alabama Childhood Lead Poisoning Prevention Program," Ala. Admin. Code § 420-4-1-AII. Mandatory reporters, including doctors, nurses, and school principals, among others, are required to report blood lead tests to county or state health departments.

[10] Lanphear et al., "Low-Level Environmental Lead Exposure and Children's Intellectual Function."

[11] National Primary Drinking Water Regulations: Lead and Copper Rule Revisions.

referred to as the Lead and Copper Rule Revisions (LCRR).[12] The revisions included major changes in six areas intended to further reduce sources of lead toxicity. First, the EPA requires all water systems to conduct an inventory of existing lead service lines and develop a replacement plan if lead service lines are present. Second, the Agency added a lead trigger level, which requires water systems to implement or re-optimize corrosion control treatment and lead service line (LSL) replacement at certain lead levels.[13] Third, the EPA has implemented changes intended to increase sampling reliability to require sampling at locations expected to be at the highest risk for possible lead.[14] Public outreach requirements have also increased, including requirements to notify customers within 24 hours of tests showing an exceedance of the SDWA lead action level (15 µg/L).[15] Previously, utilities had 30 days to provide tap sampling results, regardless of lead levels. Lastly, the 2021 Lead and Copper Rule calls for testing at 20% of elementary schools and childcare facilities annually for 5 years.[16]

Bipartisan Infrastructure Law

The Bipartisan Infrastructure Law was enacted in 2021. Its $55 billion outlay represents the largest investment in water infrastructure in the history of the United States.[17] Of this investment, $15 billion was allocated for lead service line projects. This

[12] *See generally* 40 C.F.R. 141.80

[13] 40 C.F.R. 141.81

[14] 86 FR 4198 (2021)

[15] 40 C.F.R. 141.201(a)(3)(vi) (In Table 1 to § 141.201); 40 CFR 141.202(a)(10) (In Table 1 to § 141.202); 40 C.F.R. Appendix A to Subpart Q of Part 141 C.2

[16] National Primary Drinking Water Regulations: Lead and Copper Rule Revisions.

[17] The White House, "Fact Sheet.". The White House, "Guidebook to the Bipartisan Infrastructure Law".

funding is being provided through state drinking water revolving funds (SRFs). SRFs are the funding mechanism through which the vast majority of federal infrastructure funds are distributed to states and utilities. Through SRFs, states can apply for grants, loans, or principal forgiveness to replace their existing lead service lines.[18] This money is disbursed to local drinking water and wastewater utilities through a competitive process that varies among states, but generally takes need, disadvantaged community status, and financial capacity, among other factors, into account.

Alabama has issued two lead service line intended use plans (IUPs), for FY2022 and 2023 that allocated approximately $61.1 million and $28.6 million dollars respectively for lead service line identification, remediation, and replacement.[19] The state receives the minimum 1% of drinking water SRF funds from the BIL LSLR allotment.[20] It is anticipated these allocations will result in the state receiving $57.3 million over the next two years for LSLR.

State-Level Policies in Alabama

State Department Responsible for Drinking Water Enforcement

In Alabama, the state Department of Environmental Management (ADEM) is responsible for promulgating regulations and implementing SDWA and its state equivalent, the Alabama

[18] The White House, "Guidebook to the Bipartisan Infrastructure Law | Build.Gov."
[19] EPA, "Bipartisan Infrastructure Law: Environmental Protection Agency 2022 State Revolving Fund (SRF) Grants to States, Tribes, and Territories by Program;" EPA, "FY 2023 Allotments for the Drinking Water State Revolving Fund based on the Seventh Drinking Water Infrastructure Needs Survey and Assessment."
[20] EPA, "FY 2024 Lead Service Line Allotments for the Drinking Water State Revolving Fund Provisions of the Bipartisan Infrastructure Law Funding."

Safe Drinking Water Act.[21] Oversight of ADEM is the responsibility of the state's Environmental Management Commission (EMC), a seven-member board whose members are appointed by the governor and serve six year terms.[22] The Department is under the supervision of its Director, a merit-system employee who is appointed by and serves at the pleasure of the EMC.[23]

Existing Legislation

Alabama Safe Water Drinking Act

ASDWA was passed in 1977.[24] It largely mirrors the structure and substance of the federal SDWA which was passed three years earlier. The law gives ADEM the authority to regulate public drinking water to protect public health and well-being.[25] Like SDWA, the ASDWA requires ADEM's regulation of drinking water contaminants to be at least as strict as NPDWR. Unlike some states, Alabama has not enacted a "no sooner than, no stricter than" limitation on state drinking water MCLs or MCLGs, leaving ADEM free to set standards for drinking water contaminants which are stricter than EPA's NPDWR. Both ASDWA and SDWA require water suppliers to inform customers and state officials of any failure to remain compliant with state or federal drinking water regulations.[26] Water suppliers must supply laboratory samples to the EMC at least one a month, or more frequently if required by the

[21] Ala. Code § 22-23-30 *et seq.*
[22] Ala. Environmental Mgmt. Act; Ala. Code § 22-22A-6
[23] Ala. Code § 22-22A-4
[24] Ala. Code § 22-23-30 *et seq.*
[25] *Id*.
[26] Ala. Code § 22-23-37; 40 C.F.R. 141.201 Table 1

EMC.[27] Water suppliers must obtain permits from ADEM for construction of or major modifications to public drinking water systems.[28] These permits must be obtained prior to issuing bonds or incurring any debt related to such construction or modifications.[29] ADEM and the EMC have rights of inspection, and the right to revoke construction permits or require modifications based on determinations that a facility cannot meet MCLs, or provide pure, wholesome, potable water.[30] ADEM and the EMC also have the ability to assess penalties of up to $5,000 on systems for failure to properly obtain a permit, properly sample their water and report results to the Department or the public, or other persons for polluting a water supply.

Alabama Lead Ban Act

The Alabama Lead Ban was passed in 1988.[31] The Act grants power to the ADEM to create rules to restrict the sale and installation of any plumbing materials that are not lead-free.[32] This includes pipes, solder, flux, and fixtures used for the creation or repair of any portion of a public water system. Local plumbing codes were also required to be amended to include provisions for this ban. It is unclear whether this requirement has been implemented consistently throughout the state. At least some county plumbing codes do not include lead ban provisions.[33] Further, the Lead Ban Act also includes another layer of

[27] Ala. Code 22-23-38
[28] Ala. Code 22-23-39
[29] *Id.*
[30] Ala. Code 22-23-43
[31] Ala. Code 22-37-1 *et seq.*
[32] *Id.*
[33] *E.g.*, Jefferson County Commission, Ordinance No. 1845-2 "An Ordinance to adopt a Plumbing Code for Jefferson County, Alabama." Available at:

public notice obligation. While the Safe Drinking Water Act mandates notification if water parameters exceed allowance levels, the Lead Ban Act also mandates a warning to customers of the potential for lead contamination. ADEM is also tasked with imposing penalties for violations of this act.

Regulations

Primary Drinking Water Regulations – Inorganic Chemical Standards

Alabama's primary drinking water regulations set the maximum contaminant level for lead in finished drinking water at 0.015 mg/L.[34]

Lead Ban Requirements

ADEM's regulations adopted under the Alabama Lead Ban Act set the limit for lead in pipes and connectors at 8%.[35] For flux and solder used to join pipes, the maximum level of lead allowed is 0.2%.[36]

Control of Lead and Copper

ADEM's Lead and Copper Rule largely mirrors the federal LCRR. The rule establishes monitoring frequency based on the age of the system, whether it has recently made any changes to its source water, or whether monitoring indicates that the action level has been

https://lawlib.jccal.org/Sites/Jefferson_County/Documents/Development%20Services/Documents/2020PlumbingCodeWithAmendments.pdf

[34] Alabama Primary Drinking Water Standards. Ala. Admin. Code §335-7-2-.03

[35] Ala. Admin. Code 335-7-8

[36] *Id.*

exceeded.[37] Each system has two options for monitoring frequency: initial monitoring frequency or reduced monitoring frequency. Initial monitoring frequency is once every six months and reduced monitoring frequency requires sampling once per year. If a small or medium water system has demonstrated that it is not exceeding actions levels for three consecutive years, the system may reduce monitoring frequency to once every three years. A small water system may further reduce monitoring frequency to every nine years if it demonstrates that the system does not contain any lead service lines, copper pipes, leaded brass pipes, or lead solder or flux connections, along with the preceding requirements related to action levels.

System size (number of customers served)	Initial Monitoring Sites	Reduced Monitoring Sites
>100,000	100	50
10,001-100,000	60	30
3,301-10,000	40	20
501-3,300	20	10
101-500	10	5
<100	5	5

[37] Ala. Admin. Code 335-7-11

Table adapted from Table 11-1 (Ala. Admin. Code 335-7-11-.06)

Large water systems may reduce monitoring to once every three years if results do not exceed the action level and optimized corrosion control treatment is in place. If a system makes any changes to treatment protocol, water sources, or exceeds the action level it must return to initial monitoring frequency and site number. If a system qualifies for reduced monitoring frequency, it also qualifies for a reduced number of monitoring sites.

The Alabama Lead & Copper Rule also establishes the number of monitoring sites and the selection of these sites. The number of monitoring sites depends both on the size of the system and whether the system has qualified for reduced monitoring frequency. Depending on size, and whether they qualify for reduced monitoring, systems are required to test at between 100 and 5 sites.[38]

The rule also establishes procedures for determining where to collect samples for lead and copper monitoring. Community water systems must perform a materials evaluation to identify target sampling locations. If a system finds the presence of lead service lines, 50% of the monitoring must take place at these sites. If there are not enough lead service lines to fulfill this requirement, then all lead service lines present must be sampled. Sampling sites are identified as Tier 1, 2, or 3. Tier 1 sites are single family structures that contain lead plumbing or are served by lead service lines and were

[38] Ala. Admin. Code 335-7-11-.06

constructed after 1982. Tier 2 sites are buildings and multi-family residences that contain lead plumbing and were constructed after 1982. Finally, Tier 3 sites are single-family structures containing copper pipes with lead solder constructed prior to 1983. Community water systems must then select monitoring locations based on the number of each identified tier sites. If a system finds enough tier 1 locations, then it must use all tier 1 sites. If it does not have sufficient tier 1 sites, then it may select from tier 2 or 3 until it has reached the number required based on its size and monitoring frequency.

Slightly different definitions apply to non-transient non-community water systems (NTNC). Non-transient non-community water systems are those that are not community water systems and regularly serve at least 25 of the same individuals 6 months or more per year. Schools, industrial facilities, businesses, or hospitals operating their own drinking water systems are examples of NTNCs. NTNC water system may not have a sufficient number of structures to provide sample sites. In this circumstance, the NTNC water system may collect samples from different taps or spigots within the same structure. NTNC water systems do not have a tier 3 option for site selection. In this case, if the system does not have sufficient tier 1 or 2 sites, it may use replacement sites that have non-lead plumbing materials. For NTNCs, Tier 1 sites are buildings that contain lead plumbing or are served by a lead service line and were constructed after 1982, and Tier 2 sites are buildings that contain copper pipes with lead solder and were constructed prior to 1983.

Sample collection requirements are also included in Alabama's Lead and Copper Rule. Samples must be one liter in volume and be collected after the water has remained

standing in pipes for at least six hours. The sample must be collected from the cold tap of a bathroom or kitchen sink or from a source that is known to be used for consumption. Samples may not be collected from taps that have point-of-use filters installed. If the site being monitored is known to contain lead service lines, the water may be collected directly from the service line after the water has remained standing in pipes for at least six hours. Samples may be collected from taps downstream from the service line if the amount of water between the lead service line has been calculated and that amount is allowed to run through the pipes before the sample is collected.

Any system that exceeds the lead MCL must begin corrosion control treatment and monitor water quality to determine its effectiveness. If a system continues to exceed the MCL after the implementation of corrosion control, then the water system must engage in lead service line replacement. There are six criteria a system can use to demonstrate optimum corrosion control. Systems can use any single criteria to demonstrate compliance. These are:

1. Alkalinity and pH results plotted on a Baylis curve indicate no corrosion will occur
   Or
2. The Langelier Index is between -1.0 and +2.0 (note: this value indicates the likelihood that calcium carbonate will precipitate in water. Essentially, how corrosive the water is.)
3. The Ryznar Index is between 7 and 11. (note: this value is based on the Langelier Index. Each reflects the same data simply using a different measurement)

4. A phosphate or silicate-based inhibitor is continuously applied at treatment facility

   Or

5. The Calcium Carbonate Precipitation Potential is maintained between 4-10 mg/L.

   And

6. The water monitoring continuously provides results below the lead and copper compliance limit.

Monitoring for parameters required to calculate optimal corrosion control must continue daily if using the Baylis Curve or orthophosphate inhibitor, or weekly if using the Langelier Index. With permission of the department, a system which has demonstrated optimal corrosion control for three consecutive years may reduce the frequency of corrosion control parameters to once per year.

Systems that have exceeded MCLs may also be considered to meet optimum corrosion control if they demonstrate that they have "conducted activities equivalent to the corrosion control steps" noted in the previous paragraph. Systems choosing to conduct these equivalent activities must submit a report to ADEM containing information about the water quality parameters, the tests used to determine corrosion control optimization, the method of corrosion control treatment, and details about the tap monitoring that exceeded the compliance limit. Systems using corrosion control must monitor lead levels at least once every three years.

Systems changing their source water or with samples that indicate exceedances of MCLs may be required by ADEM to submit a corrosion control study to determine which

corrosion control process will be most effective.[39] The three corrosion control methods that must be evaluated are pH and alkalinity adjustment, calcium hardness adjustment, and phosphate/silicate-based corrosion inhibitor addition. While a system is evaluating these methods, it must monitor the levels of lead, copper, pH, total alkalinity, calcium, conductivity, orthophosphates (if testing for a phosphate-based inhibitor), silicate (if testing for silicate-based inhibitor), and water temperature. The study must also identify any chemical or physical constraints that would limit the effectiveness or prevent the use of particular corrosion control processes. This includes determining if any technique may adversely affect other water treatment processes. The report must also include all costs associated with treatment, required materials, and a proposed schedule of installation.

If a system has identified the presence of lead service lines and exceeds the compliance limit even after implementing corrosion control, it must engage in lead service line replacement.[40] The first step in this process is developing a lead service line replacement plan. This includes an inventory of all lead service lines and their locations, the cost of replacing the lines, a plan for disposal, and a timeline for removal. The timeline must plan to remove all of a system's lead service lines within 15 years. Systems must replace at least 7% of the existing lead service lines annually. However, ADEM does have the ability to require a higher proportion of LSLR.

[39] Ala. Admin Code 335-7-11-.13

[40] Ala. Admin Code 335-7-11-.16

Several exceptions apply to these requirements, and certain events may allow utilities to "press pause," on LSL replacement. If first-draw samples from LSLs demonstrate that the system is meeting the compliance limit for two consecutive monitoring periods, systems can stop replacing LSLs.[41] Likewise, if the system can identify lead service lines that do not lead to an exceedance of the MCL at the tap, those specific service lines may be left intact.[42] If a system pauses service line replacement but then exceeds the compliance limit again, they must restart their lead service line replacement program and complete an updated lead service line inventory.

In circumstances where LSL replacement is required, systems may engage in partial lead service line replacement. Partial lead service line replacement, meaning only replacing the system side of the line, is not always effective in reducing lead for the user and can even temporarily increase lead levels.[43] If a system chooses to partially replace LSLs if they inform affected users that, as a result of partial lead service line replacement they may experience an increase in lead levels in their water. The system must also collect samples from taps downstream of service lines after the partial replacement. Users must be informed of these results within 3 business days.

[41] *Id.*

[42] *Id.*

[43] Trueman, Camara, and Gagnon, "Evaluating the Effects of Full and Partial Lead Service Line Replacement on Lead Levels in Drinking Water."

Lead Testing in Schools and Childcare Centers

Between 2017 and 2023, ADEM and the Alabama State Department of Education (ALSDE) partnered on a testing program for schools and childcare facilities, including pre-K, Head Start, and daycare facilities.[44] At the time it began, this program was not a state or federal statutory or regulatory requirement.[45] From 2020 onward, the sampling was supported by an EPA grant, and used EPA's "3T" model that combines testing, training and "taking action."[46] Thirty-four of the 1,200 samples taken in public schools from 2017 to 2019 exceeded the lead action level of 20 ppb.[47] From 2021 through 2023, 2,184 samples at 384 schools and childcare facilities yielded 51 samples above the action level.[48]

Relevant Policies in Neighboring States

Lead policies in Alabama's neighboring states of Mississippi, Tennessee, and Georgia largely mirror the policies in Alabama. Many statutes and regulations include identical language. However, there are some differences between these southern states.

[44] ADEM, "Child Care Facilities and Schools Lead Testing Program," available at: https://adem.alabama.gov/programs/water/drinkingwater/daycarepb.cnt
[45] *Id.*
[46] *Id.*
[47] ADEM, "Lead Testing in Schools Results," available at: https://adem.alabama.gov/newsEvents/reports/Results.pdf
[48] ADEM, "School Lead Testing Results," available at: https://adem.alabama.gov/programs/water/drinkingwater/files/SchoolTestingWebResults.pdf

Mississippi

Statutory Requirements

Mississippi also has a Safe Drinking Water Act (MSDWA) which became law in 1997.[49] The Mississippi State Department of Health (MDH) is responsible for MSDWA's implementation. Mississippi has a "no-stricter-than, no-sooner-than policy," with the MSDWA requiring that regulations shall be "no more stringent" than those contained in the Federal SDWA.[50] Unlike Alabama's statute, the MSDWA includes sections regarding provision of drinking water in emergency situations and a rule governing cross-connections, structures in drinking water systems where drinking water and non-potable may come into contact with each other.[51] When not properly designed or operated, cross-connections can cause drinking water quality issues.

Mississippi Regulations

Mississippi's drinking water regulations include provisions similar to those of the Alabama Lead Ban Act and mirror the federal lead ban requirements.[52] Beyond this, MDH does not have any specific rules regarding the control of lead and copper.[53] Rather, it simply incorporates the national lead and copper regulations, as required by the state's "no-stricter than, no-sooner than" statutory requirements.

[49] Miss. Code § 41-26-1 *et seq.*
[50] Miss. Code § 41-26-6
[51] Miss. Code § 41-26-11; 41-26-14
[52] Miss. Code of Rules 15-20-72-1.16(7)
[53] Miss. Code of Rules 15-20-72-1.3.2

Tennessee

Statutory Requirements

Tennessee also has a statute that largely mirrors the federal SDWA.[54] Tennessee's Department of Environment and Conservation (TDEC) and the Board of Water Quality, Oil, and Gas implement the law. The statute includes provisions identical to the federal lead ban, prohibiting the use of solder and flux containing more than 0.2% lead and of pipes and fittings containing more than 0.25% lead.[55]

Tennessee law also contains provisions addressing lead in school drinking water. Public school boards are required to develop and implement a program to reduce the potential of lead in drinking water provided to students.[56] These programs are mandatory in school buildings constructed prior to 1998, but school boards may voluntarily include other schools.[57] These programs include water sampling twice annually to determine lead levels in drinking water sources.[58] If sampling results indicate lead levels above 0.2 mg/L, the school must remove that water source from service and conduct remedial action to reduce lead levels.[59] The school must also notify TDEC, the Tennessee Department of Health, the local health department, the local school board, and the Tennessee

[54] Tenn. Code § 68-221-701 *et seq*.
[55] Tenn. Code
[56] Tenn. Code Ann. § 49-2-133
[57] *Id*.
[58] *Id*.
[59] *Id*.

Department of Education, along with the parents and guardians of students enrolled in the school.[60]

Tennessee Regulations

TDEC's regulations are identical to those in EPA's Lead and Copper Rule.[61] These regulations have not been updated to include the 2021 revisions.

Georgia

State Statutes

Georgia has also adopted a state Safe Drinking Water Act (GSDWA).[62] Like the other neighboring states in this survey, it largely mirrors the federal act. GSDWA vests regulatory and implementation authority in the Georgia Department of Natural Resources (GDNR) and its Environmental Protection Division.[63]

Georgia Regulations

Georgia's drinking water regulations incorporate the federal lead ban requirements.[64] They also include a lead service line inventory requirement in which water systems must notify GDNR about any LSLs in their system. Further rules regarding monitoring, records, and corrosion control are the same as those in federal regulations and in surrounding states. Notably, several portions of the rule corrosion control directly cite

[60] *Id.*
[61] Tenn. Comp. R. & Regs. r. 0400-45-01-.33
[62] Ga. Code § 12-5-170 *et seq.*
[63] Ga. Code § 12-5-171
[64] Ga. Comp. R. & Regs r. 391-3-5-.25

federal regulations instead of listing their requirements.[65] In 2023 GDNR updated its regulations to include lead service line inventory requirements.[66] Out of the neighboring states surveyed, Georgia was the only one to update its regulations to conform with the 2021 federal Lead and Copper rule.

Barriers to Full Lead Service Line Replacement in Alabama

Technology and Tools

Presently, full lead service line replacement is also limited by a water system's lack of knowledge of service line locations. LSL inventories that will be submitted in October 2024 must include the sources used to determine the presence of lead and the reliability of the source.

EPA's Office of Water published guidance in 2022 on development of lead service line inventories by utilities.[67] This includes recommendations on reviewing historical records.[68] However, many water systems may not have the capacity to thoroughly review these records, especially when many of them may date back to the early 20th century. The Environmental Policy Innovation Center has a list of service providers that offer innovative

[65] *Id.* (Notably, these citations to federal law do not include the phrase "as amended")
[66] *Id.*
[67] EPA, Office of Water, "Guidance for Developing and Maintaining a Service Line Inventory," EPA-816-B-22-001, August 2022. Available at: https://www.epa.gov/system/files/documents/2022-08/Inventory%20Guidance_August%202022_508%20compliant.pdf
[68] US EPA, "Guidance for Developing and Maintaining a Service Line Inventory."

solutions for lead service line inventories.[69] Many of these providers have grant programs that enable water systems to receive services for free or a reduced cost.[70]

Capacity

Full lead service line replacement is also dependent on a water system's financial, labor, and managerial capacity. Financial capacity limitations may have a greater impact on small water systems – those serving fewer than 3,300 consumers. Smaller systems tend to have more limited technical, financial, and managerial capacity. EPA estimates that systems serving fewer than 10,000 users have on average between 0.4 and 2.4 full time operators, which is between 2 and 11 times less than large water systems. Smaller water systems also tend to have less revenue than their larger counterparts, in some cases up to 170 times less.[71] As a result, the EPA has numerous capacity building resources that are intended to directly benefit small water systems.[72] EPA also requires that states implement capacity building programs and to evaluate a water system's capacity in the event of non-compliance. In 2022 ADEM updated its Capacity Development Program regulations. New regulations required proposed water systems and certain systems with histories of non-compliance to submit an asset management plan.[73] Since ADEM adopted these new regulations, the Department has required four water systems to prepare these asset

[69] Cunningham et al., "Menu of Options."
[70] *Id*.
[71] National Primary Drinking Water Regulations: Lead and Copper Rule Revisions.
[72] US EPA, "Technical, Managerial and Financial (TMF) Capacity Resources for Small Drinking Water Systems."
[73] Ala. Admin Code 335-7-4-.04

management plans. ADEM also credits the Capacity Development Program with reducing non-compliance among drinking water systems. The Department, in conjunction with the Alabama Rural Water Association has also evaluated the technical, managerial, and financial capacity of nearly 50 rural water systems throughout the state.[74]

It is important that ADEM continue to optimize this program in light of the lead and copper rule revisions to continue to assist small water systems with lead service line replacement. One option could be to require asset management plans for all systems with a history of non-compliance, or for all systems, regardless of compliance history. ADEM could also expand its efforts to evaluate water system capacity throughout the state, including suburban and urban systems. Lastly, the Department could offer more technical assistance for systems with unique issues with lead compliance, like NTNCs, or systems where corrosion control has not proven to be a consistently effective method of compliance.

[74] ADEM, "Alabama's 2023 Triennial Capacity Development Report."

Policy Recommendations

Model Policies

- Newark, New Jersey

The primary model policy circumstance used by the Environmental Policy Innovation Center and many other advocacy organizations is Newark, New Jersey.[75] In 2017, Newark experienced its first lead action level exceedance since banning lead in water pipes in 1953. In 2019, the city of Newark passed a local ordinance establishing a program to completely replace all lead service lines in their community. Three years later this goal was largely achieved. Several actions on the part of the city led to successful lead service line replacement. First, the city council made the lead service line replacement program mandatory and provided it at no cost to homeowners or occupants.[76] Newark replaced both the utility-owned portion and private portion of LSLs at no cost to the customer.

The process was also streamlined by ensuring that homeowners and renters were required to allow access for the purpose of replacing the lines. Newark's ordinance granted access to residences for contractors and officials for replacement purposes if an owner could not be reached or refused entry. In this case, if a tenant provided access to the property, then the city would not need consent from the owner. If the property owner refused to allow replacement of an LSL, the city could take legal action to require them to do so. Finally, the city implemented a new requirement for proof of lead service line

[75] Cunningham, "Echoing Newark."

[76] "Mandatory Replacement of Lead Service Lines," Newark, NJ Municipal Code § 16:23 (2019).

replacement at the point of any real estate transfer or sale. These three requirements significantly increased the rate of lead service line replacement in the city. However, since customers were not required to pay for LSL replacement, the city had to find alternative funding sources. Newark used a combination of SRF and municipal improvement bonds to obtain funds for the program.[38] The BIL will make pursuing a similar program more feasible for municipalities or utilities, since more funding is available through state revolving funds. Newark also used its replacement program as an opportunity to create an apprenticeship program to specifically train community members in the skills required to replace lead service lines.[77] By creating this apprenticeship program, Newark overcame the barrier posed by a potential workforce shortage and added new community benefits. By combining strict, but streamlined ordinance requirements, and creative funding combinations, Newark was able to completely replace all existing lead service lines in the city.

- Lansing, Michigan

In 1927, the city of Lansing, Michigan purchased all customer-owned portions of water service lines. However, personnel still had to get permission to enter homes to connect the new service lines to indoor plumbing. In order to obtain this permission, the city engage in

[77] New Jersey Water Workforce Committee, "Wells of Opportunity."

widespread education and communication regarding scheduling and details of the replacement.[78] Lansing was able to completely replace all lead service lines in 2016.[79]

Recommendations

Years of research have made clear that there is no safe level of lead in drinking water. Corrosion control treatment is not 100% effective. While corrosion control and partial service line replacement may act as stop-gaps, they are not-fail safe, and are not capable of permanently reducing lead content in drinking water. Removal of lead pipes, both on the utility side and inside homes is the only 100% effective and permanent method of preventing lead contamination of drinking water and its associated public health impacts. Any policy changes must acknowledge this reality and prioritize full replacement of lead service lines inside and outside of homes.

I. Lead Service Line Replacement over Corrosion Control

After an inventory is complete, the next step for utilities is lead service line replacement. The water crisis in Flint, Michigan demonstrated that corrosion control treatment is not a 100% reliable method of preventing lead from entering drinking water.[80] Therefore, the only 100% effective solution is lead service line replacement. Funding available through the Bipartisan Infrastructure Law means that replacement, the only guaranteed and permanent solution to the problem of lead in drinking water, is more cost-

[78] Hamelink, "Getting the Lead Out."
[79] "Lead Information | Lbwl.Com."
[80] Denchak, "Flint Water Crisis."

effective than it has ever been in the past, and is likely to be in the future. By updating its regulations to encourage replacement as the primary method of addressing lead exceedances, ADEM can leverage this funding to replace lead service lines ahead of the 2024 deadline at a lower cost.

II. Prioritizing Equity in LSL Replacement

Lead service lines are more frequently found in older housing stock. As a result, low-income and rural populations that tend to own or rent these older homes are at greater risk of exposure to lead.[81] This is compounded by the fact that these same populations are exposed to lead-based paint and other water contaminants at a higher rate than the general population.[82] Alabama should prioritize lead service line replacement in disadvantaged communities, communities with high proximity to other environmental hazards, and communities with higher rates of poverty. By prioritizing lower-income, minority, and disadvantaged communities, Alabama can ensure that the populations at greatest risk of lead exposure are the first to have their LSL replaced.

III. Public Funding for Private Side Replacement

Alabama should ensure that private-side LSL replacement incurs no costs for property owners or occupants. As evidenced by the success of Newark's, fully funded replacement of lead services lines is available through multiple funding avenues, including

[81] Jean Brown et al., "Association between Children's Blood Lead Levels, Lead Service Lines, and Water Disinfection, Washington, DC, 1998–2006."
[82] Kraft and Scheberle, "Environmental Justice and the Allocation of Risk"; McDonald and Jones, "Drinking Water Violations and Environmental Justice in the United States, 2011–2015."

the BIL.[83] Requiring customers to pay for private-side replacement of LSLs results in lower rates of private-side replacement.[84] This effect is magnified in low-income areas, where lead service lines are more prevalent.[85] Federal funding is not the only option for financing LSL replacement. WaterNow Alliance has extensive resources on their Tap into Resilience Toolkit regarding funding options for municipalities.[86] The EPA also has case studies on 10 municipalities' financing choices for lead service line replacement, which can act as an additional resource for funding innovation.[87]

IV. Post-Replacement Protection

All lead service line replacement may potentially result in a temporary increase in lead levels at the tap.[88] While these increases are less likely if both utility-owned and privately-owned portions of LSLs are replaced at the same time, this is not always possible. If the customer must use water services after one side has been replaced and before the remaining portion is replaced, point-of-use filters can help reduce lead levels. There also may be a potential for lead level reduction if high volume flushing of the service line and/or the taps immediately follows replacement, depending on various conditions.[89] In most cases, point-of-use filters provided to customers will be sufficient to protect customers

[83] Cunningham, "Echoing Newark."
[84] Baehler et al., "Full Lead Service Line Replacement."
[85] Klemick et al., "Factors Influencing Customer Participation in a Program to Replace Lead Pipes for Drinking Water."
[86] WaterNow Alliance, "Tap into Resilience Toolkit."
[87] US EPA, "LSLR Financing Case Studies."
[88] Deshommes et al., "Lead Levels at the Tap and Consumer Exposure from Legacy and Recent Lead Service Line Replacements in Six Utilities."
[89] Brown and Cornwell, "High-Velocity Household and Service Line Flushing Following LSL Replacement."

from temporary increases in lead levels. Point-of-use filters that are certified by an accredited body to significantly reduce or remove lead are generally the safest and most reliable method of user protection immediately following lead service line replacement.[90] In order to ensure that temporary increases in lead levels during LSL replacement do not impact customers, Alabama should include requirements for customer protection immediately following lead service line replacement.

V. Replacement Certification

The final element of an ideal lead service line replacement policy in Alabama is requiring disclosure of lead service lines or plumbing at the time of property transfer, and when tenants first sign a lease in a new home, apartment, or business. Federal requirements regarding disclosure of lead-based paint have existed for decades, and could be adapted for notification of LSLs.[91] Language within this disclosure should include clear communication of the risk of lead exposure.[92]

[90] US EPA, "Consumer Tool for Identifying Point-of-Use and Pitcher Filters Certified to Reduce Lead in Drinking Water."

[91] US EPA, "Real Estate Disclosures about Potential Lead Hazards."

[92] Lu et al., "Research to Move Toward Evidence-Based Recommendations for Lead Service Line Disclosure Policies in Home Buying and Home Renting Scenarios."

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