

**How Safe is the Water?: An Analysis of the Lead Contamination Risks of
Public Water Supplies in the Mississippi Delta**

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December 2017

NSGLC-17-05-03

Table of Contents

| | | |
|------|--|----|
| I. | Introduction..... | 2 |
| II. | Existing Regulatory Framework..... | 3 |
| | A. Overview of the Safe Drinking Water Act..... | 3 |
| | B. Contaminant Regulation..... | 4 |
| | C. Notification Requirements..... | 5 |
| | D. The Role of States and Enforcement..... | 5 |
| III. | Lead and Copper Rule..... | 6 |
| | A. Overview of the Rule..... | 6 |
| | B. Crisis in Flint..... | 8 |
| IV. | Mississippi Program..... | 10 |
| V. | Lead Crisis in Mississippi – A Case Study..... | 13 |
| VI. | State of Drinking Water Supplies in the Mississippi Delta..... | 14 |
| VII. | Challenges and Gaps..... | 25 |
| | A. Infrastructure..... | 25 |
| | B. Lack of Testing in Schools..... | 26 |
| | C. Law of Public Awareness..... | 27 |

This document was prepared by the National Sea Grant Law Center as part of an interdisciplinary project to assess the effectiveness of community-based research strategies to analyze risk of lead contamination in public water supplies in the Mississippi Delta. Project partners include the University of Mississippi School of Pharmacy and Center for Population Studies.



Initial financial support was provided by the University of Mississippi through an Office of Research and Sponsored Programs Investment Grant. Additional financial support was provided by the Mississippi Water Resources Research Institute and U.S. Geological Survey under award number G16AP00065. The statements, findings, conclusions, and recommendations are those of the authors and do not necessarily reflect the views of the University of Mississippi, MWRRI, or USGS.



I. Introduction

The dangers of lead have been well-known for a long time. Since lead is a toxic metal that persists and bioaccumulates in a person's body over time, it can be extremely harmful to humans even at low levels. Lead exposure in adults can cause hypertension and reproductive problems, as well as decrease kidney function.¹ Although lead exposure can be dangerous to adults, fetuses, infants, and young children are the most vulnerable to lead exposure. Even a low dose can damage a child's nervous system, affect growth, impair hearing, and cause learning disabilities. In addition, lead exposure can be the cause of learning and behavioral problems, as well as lowered IQs and hyperactivity.²

Lead is also a risk to pregnant women, as lead is stored in a person's bones along with calcium. When pregnant, a woman's bones will release calcium to help the fetus's bone development. Lead is released with the calcium and can also reach the fetus through the placenta. Lead exposure to an unborn fetus can cause premature births and reduce the growth of the fetus.³

Childhood lead poisoning is a challenging social issue that requires the coordination of health, housing, and environmental law and policy. There is no safe blood level for lead, and the Centers of Disease Control (CDC) states that "all sources of lead exposure for children should be controlled or eliminated."⁴ Since 1978, when the use of lead-based paint was banned in the United States, environmental and health policy has focused on reducing childhood exposure to lead-based paint and the dust produced as it deteriorates. Policy-makers have focused much less attention to the exposure to lead through other sources, despite the fact that in up to 30% of cases of children with elevated blood lead levels there is no immediate lead paint hazard.⁵

The drinking water crisis in Flint, Michigan has raised awareness of the danger that may be present in drinking water when the delivery infrastructure includes lead pipes. Mississippi communities face similar public health threats from lead exposure. A recent HealthGrove analysis of state reporting data from 2014 ranked Mississippi as one of the top 20 (#18) worst states for lead poisoning.¹ From 2009 – 2015, the Mississippi State Department of Health (MSDH) received reports of 3,083 children with elevated blood lead levels over 5 µg/dl.⁶ The actual number of cases is likely much higher, as screening is not mandatory and the number of children screened in Mississippi has declined in recent years. On average, 18% of the population of children under age 6 in the state are tested for lead poisoning each year.⁷ A study published in 2017 in the journal *Pediatrics* revealed that Mississippi may be detecting fewer than 30% of the

¹ EPA, Basic Information about Lead in Drinking Water, <http://www.epa.gov/your-drinking-water/basic-information-about-lead-drinking-water#regs> (last visited Dec. 4, 2017).

² *Id.*

³ *Id.*

⁴ Centers for Disease Control and Prevention, "What Do Parents Need to Know to Protect Their Children?" http://www.cdc.gov/nceh/lead/acclpp/blood_lead_levels.htm (last accessed October 27, 2016).

⁵ M.J. Brown and S. Margolis, Centers for Disease Control, Lead in Drinking Water and Human Blood Levels in the United States, *Morbidity and Mortality Weekly Report* Vol. 61: Supplement (2012).

⁶ Mississippi State Department of Health, 2015 Mississippi Lead Poisoning Prevention and Health Homes Program Surveillance Report 8 (2017) [*hereinafter* MSDH 2015 Surveillance Report].

⁷ *Id.* at 3.

cases of lead poisoning expected in the state.⁸ African-American children and children of low-income families are at greater risk of lead exposure due to economic, health, and housing disparities (living in older or poorly maintained housing). MSDH has classified twenty of Mississippi's 82 counties as high-risk for lead poisoning, nine of which are located in the Mississippi Delta region (Bolivar, Coahoma, Holmes, Humphreys, Leflore, Sunflower, Tallahatchie, Washington, Yazoo).⁹ In 2015, of the Delta counties, Leflore had the highest number of children with elevated blood lead levels at 19 followed by Coahoma with 9.¹⁰

Like national policy-makers and agencies, the MSDH has predominately focused on lead-based paint hazards. In recent months, however, lead contamination of drinking water has begun to garner some attention. Under the federal Safe Drinking Water Act, the EPA has issued regulations addressing lead and copper contamination in drinking water, known as the Lead and Copper Rule (LCR). Under the LCR, the lead action level is exceeded if the concentration of lead in more than 10 percent of tap water samples is greater than 0.015 mg/L (15 ppb). In January 2016, the City of Jackson, Mississippi revealed that 22% of homes tested in a June 2014 sampling event had lead levels exceeding federal action levels. On February 24, 2016, the MSDH issued an advisory to residents receiving water from the City of Jackson Water System to take precautions to minimize lead exposures, citing ongoing concerns with the City's corrosion control system. Almost 11% of homes tested in a 2016 sampling event exceeded federal action levels.¹¹

This report summarizes the legal framework governing the provision of public water supplies in Mississippi and presents the lead monitoring data of public water systems in selected counties in the Mississippi delta. This data was extracted from the Mississippi Drinking Water Watch, a publicly accessible databased maintained by the MSPH and U.S. Environmental Protection Agency (EPA). This research reveals a number of legal gaps and challenges to reducing lead exposure from public drinking water supplies in Mississippi. The report concludes with a discussion of these challenges and considers actions that policy-makers, water supply systems, community organizations, and others might take to better protect public health.

II. Existing Regulatory Framework

A. Overview of the Safe Water Drinking Act

Congress enacted the Safe Drinking Water Act (SDWA) in 1974 and amended and reauthorized it in 1986 and 1996. The SDWA is the primary federal law that protects the quality of Americans' drinking water. The SDWA authorizes the EPA to set national standards for drinking water to protect against health effects from exposure to naturally occurring and man-made contaminants. In addition to creating certain standards for contaminants, the SDWA requires that

⁸ Eric M. Roberts, et al., *Assessing Child Lead Poisoning Case Ascertainment in the US, 1999 – 2010*, 139:5 *Pediatrics* (2017).

⁹ MSDH 2015 Surveillance Report, *supra* note 6, at 10.

¹⁰ *Id.* at 11.

¹¹ Mississippi State Department of Health, *Lead and Jackson Water: Recommendations for Home Owners, Schools and Facilities* (2016), available at http://www.msdh.state.ms.us/msdhsite/_static/23,0,195,720.html (last accessed October 27, 2016).

water systems inform consumers about contaminants present in their drinking water and any violations of the law. The SDWA is an example of what is referred to as cooperative federalism. The federal government, through the EPA, sets minimum standards for drinking water quality and then works with the states, localities, and water suppliers who carry out these standards.

The SDWA regulates public water systems (PWS), which are those systems having at least 15 service connections or serve at least 25 people for at least 60 days a year. Drinking water standards may apply differently based on type and size of the PWS. These systems must ensure that the water they provide meets health standards established in EPA and state regulations. They must also test the water according to schedules in the regulations.

Under the SDWA, there are the following types of PWSs:

- A community water system is a PWS “which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.”
- A non-community water system is a PWS “that is not a community water system.” A non-community water system can either be a transient non-community water system (TWS) or a non-transient non-community water system (NTNCWS).
 - A TWS is a PWS “that does not regularly serve at least 25 of the same persons over six months per year.”
 - A NTNCWS is a PWS “that is not a community water system and that regularly serves at least 25 of the same persons over 6 months per year.”¹²

It is important to note that about 10% of people in the United States obtain their drinking water from private wells. Private wells are not regulated under the SDWA. People who use private wells must take precautions on their own to ensure their drinking water is safe.

B. Contaminant Regulation

The level of contaminants in drinking water is controlled by drinking water standards issued by the EPA. Under SDWA § 300g-1, the EPA is required to publish a maximum contaminant level goal (MCLG) and national primary drinking water regulation for contaminants that (1) may have an adverse effect on human health, (2) are known or are substantial likely to occur at a frequency and at levels of public health concern, and (3) where regulation “presents a meaningful opportunity” to reduce human health risks.¹³ The SWDA requires that a MCLG “shall be set at the level at which no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety.”¹⁴ The MCLG is not actionable – it is aspirational. The national primary drinking water regulations set enforceable “maximum contaminant levels” (MCLs) for particular contaminants and testing requirements. Thus, the MCL can be higher than

¹² 40 C.F.R. § 141.2.

¹³ 42 U.S.C. § 300g-1(b)(1)(A)(i)-(iii); 42 U.S.C. § 300f(6) (A contaminant is any physical, chemical, biological, or radiological substance or matter in water.).

¹⁴ *Id.* § 300g-1(E)(4)(A)

the MCLG, as it may not be feasible to meet the MCLG. Both the MCLG and MCL apply to all PWSs with few exceptions.¹⁵ For each contaminant, the PWS must monitor drinking water to ensure that the MCL is not exceeded. If there is an exceedance of the MCL, the regulations outline the steps the PWS must take in response.

C. Notification Requirements

Public water systems are required to provide notice of violations to persons served by the system.¹⁶ The time period for which this notice must be provided depends on whether the violation is a Tier 1, Tier 2, or Tier 3 violation.

Tier 1 violations are considered immediate threats to the public health and require notice within 24 hours of learning of the violation.¹⁷ The PWS must also initiate consultation with the responsible state agency within 24 hours. In Mississippi, this agency is MSDH. Tier 1 violations include MCL violations for contaminants like *E. coli*, nitrates, chlorine dioxide, and turbidity, as well as outbreaks of waterborne diseases. In addition, 24-hour notice is required for “[o]ther violations or situations with significant potential to have serious adverse effects on human health as a result of short-term exposure, as determined by the primacy agency either in its regulations or on a case-by-case basis.”¹⁸ The notice is supposed to be given in a form that can reasonably reach all persons served by the system, such as through radio or television, or posting notices throughout the area.¹⁹

Tier 2 violations require notice within 30 days. This notice is mostly done through the mail. Tier 2 notice covers most MCL violations, as well as some monitoring and testing violations.

Tier 3 violations require notice within one year, which can be given through annual notices (not a separate mailing). This tier covers things like other monitoring and testing violations, recording and record keeping violations, etc. Notice for these violations is most commonly provided through the distribution of annual reports, referred to as “Consumer Confidence Reports” (CCRs). The SDWA requires community water systems to prepare and distribute CCRs, which include information about the source of the system’s water, detected contaminants, and possible health effects. CCRs may be distributed to customers through the mail, publication in local newspaper, or posting online.

D. The Role of States and Enforcement

Primary enforcement authority for SWDA violations is delegated to the states. States must meet certain requirements to receive this delegation of authority from the EPA.²⁰ Direct regulation of

¹⁵ 42 U.S.C. § 300g (Regulations do not apply to public water systems that (1) solely consist of distribution and storage facilities, (2) obtain their water from a regulated public water system (3) does not sell water to any person, and (4) is not a carrier which conveys passengers in interstate commerce.).

¹⁶ 40 C.F.R. § 141.201(c)(1).

¹⁷ *Id.* § 141.202(b).

¹⁸ *Id.* § 141.202(a).

¹⁹ *Id.* § 141.202(c).

²⁰ 42 U.S.C. § 300g-2.

public water systems is therefore handled by the states, who are responsible for licensing, oversight, and enforcement to ensure the federal drinking water standards are met.

The EPA still plays a role, however, in enforcement. If a state is not fulfilling its responsibilities under the act, for example by issuing a notice of violation to a PWS, the EPA may step in. Upon discovery of such a situation, the SDWA requires the EPA to notify both the state and PWS of the violation and provide assistance to bring the system back into compliance.²¹ If the state does not act after 30 days of receiving such notice, the EPA Administrator is supposed to order the public water system to comply or the agency will institute a civil action.²²

The EPA also has emergency powers under the SWDA. When the EPA Administrator has information that a contaminant is or is likely to be present in a public water system that “may present an imminent and substantial endangerment to the health of persons, and that appropriate State and local authorities have not acted to protect the health of such persons, [he] may take such actions as he may deem necessary in order to protect the health of such persons.”²³ The actions can include an order to protect the health of the public water system’s users, including requiring “the provision of alternative water supplies by persons who caused or contributed to the endangerment” and bringing a civil suit.²⁴

Further, individuals may file citizen’s civil actions against (1) any person in violation of the SDWA, (2) the EPA where there is a failure to perform any non-discretionary act or duty, or (3) any federal agency who fails to pay a penalty under SDWA.²⁵ A citizen suit allows private individuals who were harmed by a violation of the SDWA to bring a lawsuit against the party who violated the act, whether it was the PWS, state, or EPA, or all three. These provisions are how residents of Flint, Michigan are seeking damages from the actions that led to the Flint water crisis, as discussed below.

III. The Lead and Copper Rule

A. Overview of the Rule

The EPA has issued regulations addressing lead and copper contamination in drinking water, which are known as the Lead and Copper Rule (LCR). The LCR focuses on keeping lead from leaching from plumbing into the drinking supply.²⁶ To prevent such leaching, the LCR requires PWS use “optimal corrosion control treatment.” Once the appropriate treatment option is determined by the state following a process set forth in the LCR, the PWS is required to install and operate that corrosion control throughout the distribution system.²⁷

²¹ *Id.* § 300g-2(a)(1)(A).

²² *Id.* § 300g-2(a)(1)(B).

²³ *Id.* § 300i(a).

²⁴ *Id.*

²⁵ *Id.* § 300j-8(1)(1)-(3).

²⁶ EPA, *supra* note 1.

²⁷ 40 C.F.R. § 141.82(e).

The MCLG for lead, established by the LCR, is zero, as there is no safe level of exposure to lead.²⁸ However, the EPA has set the MCL for lead at 15 ppb (.015 mg/L). The MCL is exceeded when “the concentration of lead in more than 10 percent of tap water samples collected during any monitoring period...is greater than 0.015 mg/L.”²⁹

The monitoring of lead is done through sampling of household tap water. Samples are supposed to be collected from sites that are more likely to have lead in their plumbing materials. For PWSs that serve greater than 100,000 people, the system is required to test the water at 100 sites “during two consecutive six-month periods.”³⁰ As the system size decreases, so does the number of required samples. PWS can reduce the frequency of sampling events and number of sampling sites if they meet certain criteria, such as reporting lead levels below the MCL for three consecutive years.

Table 1. Minimum Number of Tap Samples (Table from 40 C.F.R. § 141.86(c)).

| System size (number of people served) | Number of sites (standard monitoring) | Number of sites (reduced monitoring) |
|---------------------------------------|---------------------------------------|--------------------------------------|
| >100,000 | 100 | 50 |
| 10,001 to 100,000 | 60 | 30 |
| 3,301 to 10,000 | 40 | 20 |
| 501 to 3,300 | 20 | 10 |
| 101 to 500 | 10 | 5 |
| ≤100 | 5 | 5 |

If the results of this monitoring show that more than 10% of samples are above the 0.015 mg/L action level for lead, certain actions are triggered under the LCR. First, the PWS is directed to take further action to optimize its corrosion control treatment, if the system serves more than 50,000 people and it has not already optimized its control. The PWS is also required to engage in public education, including providing information about the presence of lead in the drinking water and the actions that consumers could take to decrease their lead exposure. Finally, if the PWS exceeds the MCL after installing optimal corrosion control technology, the LCR directs the PWS to replace lead service lines under its control.

An exceedance of the lead MCL triggers Tier 2 notice. In December 2016, Congress amended the SDWA through the Water Infrastructure Improvements for the Nation (WINN) Act.³¹ The focus of these SDWA amendments were on lead in drinking water as a response to the Flint water crisis. Among the amendments was a change to the public notification requirements under

²⁸ EPA, *supra* note 1.

²⁹ 40 C.F.R. § 141.80(c)(1).

³⁰ *Id.* § 141.86(c) and (d).

³¹ Water Infrastructure Improvements for the Nation (WINN) Act, P.L. 114-322 (2016).

the LCR. The change now requires PWSs to provide notice to the state, EPA, and public of exceedances of the lead action level. Prior to these amendments, notice was only required for violations of the LCR. Further, if the exceedance has the potential to cause serious adverse health effects from a short-term exposure to the water, the PWS must provide this notice within 24 hours. If the PWS does not provide this notice, the EPA must do so within 24 hours of learning of the exceedance.

B. Crisis in Flint

In 2015, news broke nationally about dangerously high levels of lead in Flint, Michigan's drinking water. As details of the lead poisoning of the city's children came to light, questions began to swirl about who was responsible. City residents had been raising concerns with the water's quality for months. Many throughout asked how such a crisis could even happen in the first place.

The legal issues in Flint revolve around the city's water system's duty to protect the city's pipes from corrosion, sample its drinking water, and notify the public of elevated lead levels under the LCR. Also at issue is whether the EPA, State of Michigan, and Flint officials acted properly under the SWDA.

As mentioned earlier, although EPA establishes the standards PWSs must meet, primary enforcement authority rests with the states. This split authority contributed to the problems in Flint as questions arose concerning who should have required the city's water system to implement corrosion control, monitor the water, and provide public notice. These issues that occurred in Flint are informative of the common challenges that towns grapple with when implementing the LCR.

1. Corrosion Control

The primary cause of the lead crisis in Flint was the decision not to institute corrosion control immediately when the City of Flint switched the source of its water supply from the Detroit Water and Sewerage Authority to the Flint River. The chemistry of the water from the Flint River was very different than the Detroit water. The LCR requires that a PWS that has optimized corrosion control shall provide written notification to the State "of any upcoming long-term change in treatment or addition of a new source."³² The LCR then directs the State to review the change and approve it before the change is implemented.³³ At the time of the switch, Michigan DEQ did not require that optimal corrosion control treatment be instituted. The DEQ opted instead for a "wait and see" approach, requiring only initial monitoring of the water supply. This decision allowed the water from the Flint River to corrode lead plumbing in Flint, causing lead to leach in the water.

In response to the Flint crisis, the EPA issued a memo clarifying when optimal corrosion control treatment was required under the LCR when a water system switched from a treated water source

³² 40 C.F.R. § 141.81(b)(iii). *See also* 40 C.F.R. § 141.90(a)(3).

³³ *Id.*

(e.g., Detroit water) to a new drinking water source (e.g., Flint River).³⁴ The memo states that this situation “rarely arises” and the LCR “does not specifically address such circumstances.” While noting “that there are differing possible interpretations” of the LCR, the EPA takes the position in the memo that large water systems (systems providing water to more than 50,000 people) that have met the optimal corrosion control treatment requirements are required “to continue operating and maintaining the treatment” when switching water sources. The memo also notes the need for water systems to consult with their state agency to “evaluate and address potential impacts resulting from treatment and/or source water changes.” Finally, the memo notes the importance of monitoring the water after the source change.

2. Sampling

As the lead crisis unfolded, concerns emerged regarding how the city conducted its sampling to comply with LCR monitoring requirements. Under the LCR, tap samples are supposed to be collected from sites that are more likely to have lead in their plumbing materials, which the PWS is directed to identify in order to have a sufficient “pool of targeted sampling sites.”³⁵ Specifically, if a water system contains lead service lines, then 50% of the samples are supposed to come from sites that have lead pipes, with the other 50% of samples coming from sites with lead service lines. If the system does not have a sufficient number of sites with lead service lines, the system is directed to obtain samples from all the identified sites with lead service lines.³⁶

As discussed above, PWSs that serve greater than 100,000 people are required to test the water at 100 sites “during two consecutive six-month periods,” unless the PWS qualifies for reduced monitoring.³⁷ Samples are supposed to be collected from the same sites during the two monitoring periods. If the system “cannot gain entry to a sampling site in order to collect a follow-up tap sample, the system may collect the follow-up tap sample from another sampling site in its sampling pool as long as the new site meets the same targeting criteria, and is within reasonable proximity of the original site.”³⁸

There are allegations that Flint’s water system did not meet these requirements. Although the water system collected samples between July and December 2014 and between January and June 2015, after the switch to the Flint River, critics charge that samples were collected without regard for whether the site contained lead plumbing or was served by a lead service line. There are also questions about whether the city identify a targeted sampling pool as required by the LCR or even knew where lead service lines are located in the city.³⁹ Some have argued that there are enough homes in the city with lead service lines or plumbing that all of the system’s samples

³⁴ Environmental Protection Agency, Memorandum to EPA Regional Water Division Directors re: Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems (Nov. 3, 2015), available at https://www.epa.gov/sites/production/files/2015-11/documents/occt_req_memo_signed_pg_2015-11-03-155158_508.pdf.

³⁵ 40 C.F.R. § 141.86(a)(1).

³⁶ *Id.* § 141.86(a)(8).

³⁷ *Id.* § 141.86(c) and (d).

³⁸ *Id.* § 141.86(b)(4).

³⁹ *Concerned Pastors for Social Action v. Khouri*, 2:16-cv-10277-MAG-SDD, Complaint at para. 147-150, p.45-46 (E.D. Michigan Jan. 27, 16).

should have come from these sites.⁴⁰ The city may also have failed to sample from the same sites during the two sampling periods. Allegations included in a legal complaint filed against government officials state that “[f]or the January-June 2015 monitoring period, the Water System collected tap water samples from only thirteen of the one hundred homes used during the previous six-month monitoring period. Each of these thirteen sampling sites had lead levels below the lead action level during the previous monitoring period.”⁴¹

By not adhering to the sampling requirements as set forth in the LCR, the City’s water system could have affected whether the water samples fell below the MCL. Sampling performed by Virginia Tech researchers at the request of a concerned resident revealed much higher levels of lead than the city’s water system’s monitoring.⁴²

IV. Mississippi Program

The EPA has delegated primary enforcement responsibility for public water systems in Mississippi to the State of Mississippi. Mississippi implements the requirements of the federal SDWA through the Mississippi Safe Drinking Water Act of 1997⁴³ and associated regulations. Miss. Code Ann. § 41-26-5 gives the Mississippi State Board of Health (Board) the authority “to establish policies, requirements or standards governing the source, collection, distribution, purification, treatment and storage of water for public water systems as it deems necessary for the provision of safe drinking water.”⁴⁴ The Board is authorized to adopt rules and regulations governing public water systems, but the Mississippi Legislature directed that such rules may not “be more stringent or extensive in scope, coverage, and effect than regulations promulgated by the [EPA].”⁴⁵ The Board, however, may act to fill gaps if federal regulations do not provide a relevant standard, criteria, or guidance.⁴⁶

The construction and operation of public water systems in the state is overseen by the MSDH State Health Officer.⁴⁷ Community public water systems may not be constructed or changed unless such plans have been submitted and approved by the State Health Officer. Applicants for new community public water systems must also submit an operation and maintenance plan, as well as financial and managerial information.⁴⁸ The State Health Officer may place additional requirements beyond those required by federal law on a public water system on a case-by-case basis by order or in the approval of construction plans or changes.⁴⁹ The State Health Officer may not approve any plans for changes to an existing community public water system if she

⁴⁰ *Id.* at para. 142, p.44.

⁴¹ *Id.* at para. 154, p. 48.

⁴² *See generally*, Anna Marie Barry-Jester, *What Went Wrong in Flint*, FIVETHIRTYEIGHT, Jan. 26, 2016, <https://fivethirtyeight.com/features/what-went-wrong-in-flint-water-crisis-michigan/>.

⁴³ MISS. CODE ANN. § 41-26- 1 *et. seq.*

⁴⁴ *Id.* § 41-26-5(1)(a).

⁴⁵ *Id.* § 41-26-6(1).

⁴⁶ *Id.* § 41-26-6(2).

⁴⁷ *Id.* § 41-26-8(1).

⁴⁸ *Id.* § 41-26-8(2)(b) and (f).

⁴⁹ *Id.* § 41-26-6(3).

“determines the change would threaten the viability of the system or if the changes may overload the operational capabilities of the system.”⁵⁰

Pursuant to its authority under Miss Code Ann. § 41-26-5, the Board promulgated the Mississippi Primary Drinking Water Regulations.⁵¹ The regulations incorporate by reference the maximum contaminant levels and sampling and testing requirements of the National Primary Drinking Water Regulations published by the EPA in Title 40 C.F.R. Part 141. The state’s action level for lead is therefore identical to the federal action level: “more than 10 percent of tap water samples is greater than 0.015 mg/L.”⁵²

The MSDH Bureau of Public Water Supply identifies five programmatic areas within the state’s Public Water Supply Program:

- Microbiological, chemical, and radiological monitoring of drinking water supply;
- Negotiation (consultation with engineers on final designs/specifications for all new or substantially modified public water supplies);
- Annual surveys of each system to identify/eliminate operation/maintenance problems that may affect drinking water supply;
- Enforcement to ensure Safe Drinking Water Act standards are met; and
- Licensure of engineers, operators, testers, and MSDH environmental staff.⁵³

Public water systems are required to notify the Board, EPA Administrator, and county or district health department, as soon as practicable, if one of the following conditions exists:

- The system is not in compliance with the Mississippi Primary Drinking Water Regulations;
- The system fails to perform required monitoring;
- The system is subject to a variance granted for inability to meet a maximum contaminant level requirement;
- The system is subject to an exemption; or
- The system fails to comply with the requirements of an exemption or variance.⁵⁴

The PWS must also provide public notice if one of these conditions exist.⁵⁵ Such notice is to be provided in customer water bills and published at least once every three months in a newspaper of general circulation in the area served by the water system. Notice must also be provided to other communication media serving the area as soon as practicable after discovery of the condition.

⁵⁰ *Id.* § 41-26-8(2)(g).

⁵¹ MISS ADMIN. RULE § 15-20-72.

⁵² *See* 40 CFR § 141.80.

⁵³ MSDH, Bureau of Public Water Supply, [www.msdh.ms.gov/msdhsite/ static/30,0,76.html](http://www.msdh.ms.gov/msdhsite/static/30,0,76.html) (last visited Dec. 1, 2017).

⁵⁴ MISS. CODE ANN. § 41-26-13(1).

⁵⁵ *Id.* § 41-26-13(2).

The MSDH makes available to the public the sampling and testing results of public water systems through its Drinking Water Watch website.⁵⁶ Individual sampling results and summaries of lead and copper testing are available for all public water systems in the state. In addition, the MSDH posts the Consumer Confidence Reports and the Mississippi Water Systems Compliance Report, which identifies all violations occurring in the past year.

The Mississippi Safe Drinking Water Act established two funds to facilitate the implementation of the act's mandates. The Drinking Water Quality Analysis Fund is used by the MSDH to pay all reasonable costs of water quality analysis and related activities required by the federal SDWA, as well as capital expenditures for new equipment or repairs.⁵⁷ Revenue for the Drinking Water Quality Analysis Fund is generated from the assessment of fees of \$2.80 per connection or \$40,000 per system, whichever is less.⁵⁸ An annual review of the costs and needs of the water quality analysis program is conducted by an advisory committee whose membership includes a representative from the Mississippi Rural Water Association, Mississippi Municipal Association, Mississippi Association of Supervisors, and Mississippi Water and Pollution Control Operators Association.⁵⁹

The Mississippi Legislature also created the Public Water Assistance Fund, which consists of two accounts.⁶⁰ The Public Water System Technical Assistance Account is used by MSDH to pay the reasonable cost of providing technical assistance to public water systems. The technical assistance account is funded, in part, by fines and penalties imposed for violations. The Public Water Systems Bond Operations Account is used by courts to address or correct noncompliance.⁶¹

The Mississippi Safe Drinking Water Act directs the Board to develop and implement a technical assistance program to improve the technical, managerial, and financial capabilities of small community public water systems.⁶² This program is also intended to help potentially non-viable community public water systems to become viable.⁶³

Individuals elected to serve on the governing board of any community public water system must attend a minimum of eight hours of management training within two years of their election.⁶⁴ This requirement does not apply to systems operated by municipalities with a population greater than 10,000. A member who fails to comply with this training requirement is subject to removal from the board.

⁵⁶ <https://apps.msdh.ms.gov/DWW/>.

⁵⁷ MISS CODE ANN. § 41-26-23(1).

⁵⁸ *Id.* § 41-26-23(2); MISS. ADMIN. RULE tit. 15, Subpart 72, r. 4.2.1.

⁵⁹ MISS. CODE ANN. § 41-26-23(3).

⁶⁰ *Id.* §§ 41-26-25.

⁶¹ *See id.* § 41-26-31(5)(c).

⁶² *Id.* § 41-26-5(3).

⁶³ *Id.*

⁶⁴ *Id.* § 41-26-101.

V. Lead Crisis in Jackson Mississippi – A Case Study

The City of Jackson’s public water system serves a population of 192,547. In January 2016, the MSDH notified the city that 22% of samples tested in June 2015 exceed the federal action level of 15 ppb.⁶⁵ Thirteen homes out of the 58 sampled had elevated levels of lead.⁶⁶

Problems with the city’s system may have started as early as 2013. According to data available in the Mississippi Drinking Water Watch database, lead results for the sampling periods from 1992 to 2009 ranged between 3 and 5 ppb. Then, for the 2010 – 2012 monitoring period, the city reported results of 13.7 ppb. These results were not high enough to exceed the lead MCL and trigger any mandatory action, but should have raised concerns about the potential health risks to system customers.

As part of its corrective actions, the MSDH required the city to conduct a corrosion control study. The study’s authors identified a failing lime-feed system at the city’s OB Curtis Water Treatment Plant as the likely culprit of the elevated levels of lead.⁶⁷ Lime is added to regulate the pH of the system’s water and reduce the risk of lead leaching from the pipes. The lime-feed system may have been malfunctioning for years due a clogged valve. Insufficient lime was entering the system, resulting in water with a lower pH. As the water became more corrosive, more lead leached from the pipes. Another factor contributing to the elevated lead levels may have been changes in water chemistry that resulted from the city’s multiple switches between well water and surface water during infrastructure repairs.

As the corrosion control study got underway, the city continued to experience problems stabilizing the levels of pH, alkalinity, and hardness within the system. In June 2016, the MSDH issued the city a “treatment technique violation” due to the city’s “failure to maintain the treatment necessary to minimize corrosion throughout the distribution.” Then, in September, 13 of the 120 water samples collected by the city tested above 15 ppb. Ten percent of the samples had again exceeded the action level. In December, the city council was notified that the lime-feed system was functioning properly and that lead levels were expected to be lower when sampled in February 2017.

The levels did appear to fall for the January 1, 2017 to June 30, 2017 monitoring period, with a reported 90th percentile measure of 7 ppb (meaning 10% of the samples are greater than 7 ppb). Only 6 of 114 water samples collected contained lead levels above 15 ppb.⁶⁸

However, the results for July 1, 2017 to September 31, 2017 are again worrisome. The 90th percentile measure is 14.8 ppb, double the measure from the previous reporting period and just .2

⁶⁵ Kate Galbraith and Matthew Teague, *High Levels of Lead found in Mississippi Capital’s Water Likened to Flint Crisis*, THE GUARDIAN (Mar. 17, 2016).

⁶⁶ Josh Sanburn, *Another U.S. City Finds Lead in its Drinking Water*, TIME (Feb. 5, 2016).

⁶⁷ Tim Summers, *Jackson Water: Lime Problem Went Unnoticed for Years, Fixed Now*, JACKSONFREEPRESS.COM (Nov. 30, 2016).

⁶⁸ Anna Wolfe, *Jackson Water Issues Persist: Lead Levels Down but pH Still Too Low*, THE CLARION-LEDGER (July 3, 2017).

ppb shy of exceeding the MCL. In June 2017, the average pH was 7.4.⁶⁹ The compliance plan mandates that the city maintain a constant pH of 8.5, and the corrosion control study determined a pH of 8.6 was needed. The city continues to experience technical issues with the lime-feed system, and is in the process of converting to a soda ash feed system. Jackson residents, meanwhile, remain at risk of lead exposure through the drinking water supply.

VI. State of Drinking Water Supplies in the Mississippi Delta

The distribution system for drinking water in Mississippi is incredibly fragmented. It is not uncommon for counties in Mississippi to have ten or more public water systems. There is an average of 18 PWS in the nine Delta counties that are the focus of this report (Bolivar, Coahoma, Humphreys, Leflore, Panola, Quitman, Sunflower, Tallahatchie, and Washington). The population served by an individual PWS varies widely as illustrated by Figure 1.

Figure 1. County-level PWS service data.

| County | Population Est US Census 2016 | Number of Public Water Systems | Pop. Served | Average Pop. Served | Min. Pop. Served | Max. Pop. Served |
|--------------|-------------------------------|--------------------------------|-------------|---------------------|------------------|------------------|
| Bolivar | 32737 | 28 (2 non-community) | 38,840 | 1,387 | 110 | 15,000 |
| Coahoma | 23809 | 20 (1 non-community) | 28,852 | 1,602 | 231 | 17,962 |
| Humphreys | 8513 | 11 (1 non-community) | 9,511 | 865 | 56 | 5,016 |
| Leflore | 29856 | 17 (4 non-community) | 29,791 | 1752 | 45 | 16,000 |
| Panola | 34164 | 30 (6 non-community) | 34,857 | 1162 | 25 | 9,971 |
| Quitman | 7349 | 14 | 8,149 | 585 | 80 | 2,446 |
| Sunflower | 26407 | 14 | 28,203 | 2,015 | 190 | 10,683 |
| Tallahatchie | 14394 | 16 | 13,676 | 855 | 39 | 3,299 |
| Washington | 47231 | 18 (3 non-community) | 52,216 | 2,900 | 25 | 34,400 |

The LCR requires PWS to report all tap sample results to the state. As mentioned above, the results of this sampling is made publicly available by the MSPH through its Drinking Water Watch website. The tables below contain information on the PWS in each county and the lead measurements for the most recent monitoring periods. Additional information is provided for PWS that report a 90th Percentile sample above 5 ppb or are on annual or standard monitoring (6-month intervals), as this is an indication that the PWS may have exceeded the lead MCL in previous monitoring periods.

It is important to note that, due to the small size of most PWSs in the region, the required sample sizes for lead monitoring are quite small – usually just 5 or 10 samples. For many PWSs, this means that less than 1% of the homes served are tested for lead. The usefulness of this data to determine a community’s lead contamination risk is therefore limited. A review of lead monitoring data can help identify PWS that may be experiencing problems with their corrosion control or other aspects of their system. However, the lead risks of individual homes throughout the community is unknown.

⁶⁹ *Id.*

Bolivar County: Lead Monitoring Data for 26 Active Community PWS

| PWS | Pop. Served | Sample Size | Monitoring Period Begin | Monitoring Period End | 90th Percentile (ppb) |
|---------------------------------|--------------------|--------------------|--------------------------------|------------------------------|---|
| Boyle-Skene W/A #2 | 1,108 | 10 | 1/1/15 | 12/31/17 | 1.8 |
| Boyle-Skene W/A #3 | 1,373 | 10 | 1/1/13 | 12/31/15 | 4.6 |
| Boyle-Skene Water Assn. | 871 | 10 | 1/1/15 | 12/31/17 | .9 |
| Boyle-Skene-Benoit | 462 | 10 | 1/1/15 | 12/31/17 | 2 |
| City of Cleveland | 15,000 | 34 | 1/1/13 | 12/31/15 | 1.3 |
| City of Mound Bayou | 2,025 | 10 | 1/1/15 | 12/31/17 | 1.2 |
| City of Rosedale | 1,873 | 10 | 1/1/15 | 12/31/17 | 0 |
| Deeson Roundlake #2 | 185 | 5 | 1/1/13 | 12/31/15 | 2 |
| Deeson Roundlake Water Corp. | 211 | 5 | 1/1/13 | 12/31/15 | .4 |
| Delta State University | 3,200 | 10 | 1/1/15 | 12/31/17 | 1 |
| Lamont Water Corporation | 110 | 5 | 1/1/15 | 12/31/17 | .8 |
| North Bolivar Water Assn. | 664 | 20 | 1/1/13 | 12/31/15 | .5 |
| Scott Combined Water & Sewer D. | 150 | 6 | 1/1/15 | 12/31/17 | 4.9 |
| Symonds Water Association | 150 | 5 | 1/1/12 | 12/31/14 | .3 |
| Town of Alligator | 220 | 5 | 1/1/15 | 12/31/17 | 0 |
| Town of Benoit | 500 | 10 | 1/1/15 | 12/31/17 | 8.1 |
| Town of Beluh | 432 | 5 | 1/1/15 | 12/31/17 | 0 |
| Town of Boyle | 650 | 11 | 1/1/13 | 12/31/15 | .5 |
| Town of Duncan | 423 | 6 | 1/1/15 | 12/31/17 | .3 |
| Town of Gunnison | 537 | 10 | 1/1/17 | 12/31/19 | 0 |
| Town of Merigold | 552 | 10 | 1/1/15 | 12/31/17 | 5.2 |
| Town of Pace | 278 | 10 | 1/1/15 | 12/31/17 | 0 |
| Town of Renova | 1,597 | 3 | 1/1/15 | 12/31/17 | .8 |
| Town of Shaw | 1,912 | 10 | 1/1/15 | 12/31/17 | 1.2 |
| Town of Winstonville | 500 | 10 | 1/1/15 | 12/31/17 | 1 |

The Town of Benoit collected samples for the current reporting period on August 22, 2016. The results for the ten samples (ranked lowest to highest) were:

1. .5
2. .5
3. .7
4. .8
5. 1.2
6. 1.6
7. 3.3
8. 5.5
9. 8.1 (90th Percentile)
10. 11.7

The Town of Merigold collected samples for the current reporting period on September 7, 2016. The results for the ten samples (ranked lowest to highest) were:

1. .5
2. .5
3. .6
4. .6

- 5. .9
- 6. 1
- 7. 1.9
- 8. 2.1
- 9. 5.2
- 10. 7.7

Coahoma County: Lead Monitoring Data for 17 Active Community PWS

| PWS | Pop. Served | Sample Size | Monitoring Period Begin | Monitoring Period End | 90th Percentile (ppb) |
|--------------------------------|--------------------|--------------------|--------------------------------|------------------------------|---|
| Clarksdale Public Utilities | 17,962 | 30 | 1/1/14 | 12/31/16 | 4.9 |
| Coahoma Community College | 2,000 | 21 | 1/1/17 | 6/30/17 | 7 |
| Coahoma Utility District | 546 | 10 | 1/1/14 | 12/31/16 | 1.4 |
| Green Acres W/A – North | 528 | 7 | 1/1/15 | 12/31/17 | 1.7 |
| Green Acres W/A – South | 260 | 5 | 1/1/15 | 12/31/17 | 3.1 |
| LU-Rand Utility District | 231 | 5 | 1/1/15 | 12/31/17 | 1.7 |
| Moore Bayou W/A #2 | 526 | 17 | 1/1/15 | 12/31/17 | 3.6 |
| Moore Bayou W/A #3 | 400 | 5 | 1/1/13 | 12/31/15 | 1.7 |
| Moore Bayou Water Association | 540 | 6 | 1/1/15 | 12/31/17 | 1.4 |
| Pine Grove Water Association | 415 | 5 | 1/1/17 | 12/31/19 | 1.2 |
| Rena Lara Water Association | 412 | 10 | 1/1/15 | 12/31/17 | 2.4 |
| Town of Coahoma | 377 | 5 | 1/1/15 | 12/31/17 | 2.0 |
| Town of Friars Point | 1,200 | 10 | 1/1/13 | 12/31/15 | 1.2 |
| Town of Jonestown | 1,298 | 10 | 1/1/15 | 12/31/17 | 1.9 |
| Town of Lula | 325 | 5 | 1/1/15 | 12/31/17 | 0 |
| Town of Lyon | 382 | 5 | 1/1/15 | 12/31/17 | 1.4 |
| Water Association of Moon Lake | 500 | 10 | 1/1/15 | 12/31/17 | 1.6 |

The following table contains sampling data for Coahoma Community College since 2012. Although there were no exceedances of the lead MCL, the 90th percentile result is consistently above 5 ppb. Of the 104 samples taken, 23 exceeded 5 ppb (23 samples). There was an exceedance of the copper MCL during the 1/1/2012 – 12/31/2014 monitoring period that triggered the return to standard monitoring.

| Monitoring Period Begin | Monitoring Period End | Number of Samples | 90th Percentile (ppb) | Highest Sample (ppb) |
|--------------------------------|------------------------------|--------------------------|---|-----------------------------|
| 1/1/17 | 6/30/17 | 21 | 7 | 55.8 |
| 7/1/16 | 12/31/16 | 20 | 5.8 | 19.2 |
| 1/1/16 | 6/30/16 | 14 | 5.8 | 8.2 |
| 7/1/15 | 12/31/15 | 20 | 8.4 | 16.5 |
| 1/1/15 | 6/30/15 | 19 | 7.5 | 14.4 |
| 1/1/12 | 12/31/14 | 10 | 10.9 | 12.3 |

Humphreys County: Lead Monitoring Data for 10 Active Community PWS

| PWS | Pop. Served | Sample Size | Monitoring Period Begin | Monitoring Period End | 90 th Percentile (ppb) |
|---------------------------------|-------------|-------------|-------------------------|-----------------------|-----------------------------------|
| City of Belzoni | 5,016 | 20 | 1/1/14 | 12/31/16 | 1.5 |
| Humphreys Co. W/A – Woodyard | 56 | 5 | 1/1/15 | 12/31/17 | 2.5 |
| Humphreys Co. W/A – Gooden Lak | 861 | 10 | 1/1/14 | 12/31/16 | 0 |
| Humphreys Co. – Tchula Lake #7 | 172 | 5 | 1/1/13 | 12/31/15 | 1 |
| Humphreys Co. W/A #1 – Midnight | 766 | 10 | 1/1/15 | 12/31/17 | 2.7 |
| Humphreys Co. W/A #2 – Brooklyn | 206 | 5 | 1/1/17 | 12/31/17 | 1 |
| Humphreys Co. W/A #3 – Jaketown | 615 | 10 | 1/1/15 | 12/31/17 | 2.9 |
| Town of Isola | 700 | 10 | 1/1/15 | 12/31/17 | 1.1 |
| Town of Louise | 647 | 11 | 1/1/15 | 12/31/17 | 1.1 |
| Town of Silver City | 337 | 5 | 1/1/15 | 12/31/17 | 7.6 |

The following table contains sampling data for Humphreys Co. W/A #2 - Brooklyn since 2012. There was an MCL exceedance reported in the 1/1/12 – 12/31/14 monitoring period. This data illustrates how the existence of individual samples with very high lead concentrations may be masked by reporting only the 90th percentile concentration. A 90th percentile concentration of zero also raises questions regarding the reliability of the sampling data. Of the 40 samples, almost 60% (23 samples) had concentration levels of .5 ppb, including all 10 samples from the 1/1/16 – 6/30/16 monitoring period. Considering that PWS are supposed to sample from homes with the most risk of lead contamination, this much consistency among samples would not be anticipated.

| Monitoring Period Begin | Monitoring Period End | Number of Samples | 90 th Percentile (ppb) | Highest Sample (ppb) |
|-------------------------|-----------------------|-------------------|-----------------------------------|----------------------|
| 1/1/17 | 12/31/17 | 5 | 1 | 1 |
| 1/1/16 | 6/30/16 | 10 | 0 | .5 |
| 7/1/15 | 12/31/15 | 10 | 1.1 | 4.9 |
| 1/1/15 | 6/30/15 | 10 | 1.9 | 227.7 |
| 1/1/12 | 12/31/14 | 5 | 32.5 | 60.2 |

The Town of Silver City collected samples for the current reporting period on August 21, 2017. The results for the five samples (ranked lowest to highest) were:

1. .5
2. .5
3. 1.3
4. 3.5
5. 11.7

Leflore County: Lead Monitoring Data for 13 Active Community PWS

| PWS | Pop. Served | Sample Size | Monitoring Period Begin | Monitoring Period End | 90th Percentile (ppb) |
|---------------------------------|--------------------|--------------------|--------------------------------|------------------------------|---|
| America's Catch the Farm | 300 | 6 | 1/1/14 | 12/31/16 | 1.5 |
| Blue Lake Water Assn. | 280 | 10 | 1/1/15 | 12/31/17 | 1.3 |
| City of Greenwood | 16,000 | 30 | 1/1/14 | 12/31/16 | 1.5 |
| City of Itta Bena | 2,049 | 10 | 1/1/14 | 12/31/16 | .8 |
| City of Schlater | 334 | 5 | 1/1/15 | 12/31/17 | 4.3 |
| City of Schlater (PD Plant) | 130 | 5 | 1/1/15 | 12/31/17 | 1 |
| Delta Mobile Home Pk & Apt | 250 | 5 | 1/1/17 | 6/30/17 | 1.1 |
| East Leflore Water & Sewer D. | 5,796 | 23 | 1/1/14 | 12/31/16 | 2 |
| Minter City Water & Sewer | 539 | 10 | 1/1/15 | 12/31/17 | 1.3 |
| Morgan City Water & Sewer Assn. | 350 | 5 | 1/1/15 | 12/31/17 | 1.8 |
| MS Valley State University | 2,250 | 10 | 1/1/15 | 12/31/15 | 1.2 |
| Phillipston Water Assn. | 108 | 5 | 1/1/15 | 12/31/17 | .4 |
| Town of Sidon | 600 | 11 | 1/1/15 | 12/31/17 | .8 |

The following table contains sampling data for the Delta Mobile Home Park and Apartment PWS since 2009, which reveals two periods with MCL exceedances. Of the 51 samples, only 5 exceeded 5 ppb (10%). Three of those 5 samples, however, were quite high: 20.1 ppb, 27.4 ppb, and 46.8 ppb.

| Monitoring Period Begin | Monitoring Period End | Number of Samples | 90th Percentile (ppb) | Highest Sample (ppb) |
|--------------------------------|------------------------------|--------------------------|---|-----------------------------|
| 1/1/17 | 6/30/17 | 5 | 1.1 | 1.3 |
| 1/1/16 | 12/31/16 | 5 | 18.6 | 27.4 |
| 1/1/15 | 12/31/15 | 5 | 6.1 | 9.9 |
| 1/1/14 | 12/31/14 | 5 | 2.1 | 2.3 |
| 1/1/13 | 12/31/13 | 5 | 3 | 5 |
| 7/1/12 | 12/31/12 | 10 | 1.4 | 2.4 |
| 1/1/12 | 6/30/12 | 10 | .8 | .9 |
| 1/1/09 | 12/31/11 | 6 | 30.8 | 46.8 |

Panola County: Lead Monitoring Data for 24 Active Community PWS

| PWS | Pop. Served | Sample Size | Monitoring Period Begin | Monitoring Period End | 90th Percentile (ppb) |
|----------------------------------|--------------------|--------------------|--------------------------------|------------------------------|---|
| ASL Water Association | 840 | 10 | 1/1/15 | 12/31/17 | 2.2 |
| Chickasaw Hills Subdivision | 132 | 5 | 1/1/15 | 12/31/17 | 3.6 |
| City of Batesville | 9,971 | 24 | 1/1/14 | 12/31/16 | 2 |
| City of Sardis | 3,255 | 10 | 1/1/15 | 12/31/17 | .9 |
| Concord-Macedonia W/A | 407 | 5 | 1/1/15 | 12/31/17 | 1 |
| Enid Shores Dev. Water Company | 325 | 5 | 1/1/15 | 12/31/17 | 0 |
| Enon-Locke Curtis Water Assn. | 1,558 | 11 | 1/1/17 | 12/31/17 | 1.8 |
| Eureka Water Association | 1,122 | 8 | 1/1/15 | 12/31/17 | .8 |
| Hebron Water Association | 1,119 | 10 | 1/1/15 | 12/31/17 | 3 |
| Hide-a-way Hills Water Company | 150 | 10 | 7/1/17 | 12/31/17 | 8.9 |
| Hotophia Water Association | 2,033 | 10 | 1/1/15 | 12/31/17 | 1.6 |
| Independence Water Association | 1,729 | 11 | 1/1/15 | 12/31/17 | .55 |
| Liberty Hill Water Association | 713 | 10 | 1/1/15 | 12/31/17 | 1.8 |
| Love Joy Water Association | 731 | 10 | 1/1/15 | 12/31/17 | 0 |
| Mt. Olivet Water Association | 1,040 | 10 | 1/1/15 | 12/31/17 | .6 |
| North Panola Water District | 1,260 | 10 | 1/1/14 | 12/31/16 | 1 |
| Panola-Union W/A | 750 | 10 | 1/1/15 | 12/31/17 | 1 |
| Pleasant Grove Water Association | 697 | 10 | 1/1/15 | 12/31/17 | 1.1 |
| Plum Point Water System | 126 | 5 | 1/1/17 | 12/31/17 | 5.5 |
| Pope-Courtland W/A – North | 1,637 | 10 | 1/1/14 | 12/31/16 | 1.2 |
| Pope-Courtland Water Assn. | 818 | 10 | 1/1/15 | 12/31/17 | 1.5 |
| Sardis Lake Community W/A | 1,417 | 11 | 1/1/15 | 12/31/17 | .9 |
| Town of Como | 1,279 | 10 | 1/1/12 | 12/31/14 | 1.1 |
| Town of Crenshaw | 885 | 10 | 1/1/15 | 12/31/17 | 3.7 |

The following table contains sampling data for Enon-Locke-Curtis Water Association since 2012, which reveals one period with a MCL exceedance.

| Monitoring Period Begin | Monitoring Period End | Number of Samples | 90th Percentile (ppb) | Highest Sample (ppb) |
|--------------------------------|------------------------------|---------------------------------|---|-----------------------------|
| 1/1/17 | 12/31/17 | 11 | 1.8 | 2.8 |
| 7/1/16 | 12/31/16 | No Samples Reported in Database | | |
| 1/1/16 | 6/30/16 | 23 | 1.8 | 1.9 |
| 7/1/15 | 12/31/15 | 23 | 7.2 | 9.9 |
| 1/1/15 | 6/30/15 | 23 | 2.7 | 2.7 |
| 1/1/12 | 12/31/14 | 12 | 47 | 52.4 |

The following table contains sampling data for Hide-a-way Hills Water Company since 2009, which reveals lead levels frequently over 15 ppb. Of the 136 samples, almost 60% exceeded 5 ppb (77 samples). 22 samples (16%) exceeded the MCL of 15 ppb. The PWS received notices of LCR violations in 2010 and 2011.

| Monitoring Period Begin | Monitoring Period End | Number of Samples | 90 th Percentile (ppb) | Highest Sample (ppb) |
|-------------------------|-----------------------|-------------------|-----------------------------------|----------------------|
| 7/1/17 | 12/31/17 | 10 | 8.9 | 12.9 |
| 1/1/17 | 6/30/17 | 10 | 11.6 | 25.8 |
| 1/1/16 | 12/31/16 | 5 | 17* | 7.8 |
| 1/1/15 | 6/30/15 | 10 | 11.5 | 26.3 |
| 7/1/14 | 12/31/14 | 10 | 5.2 | 28.9 |
| 1/1/14 | 6/30/14 | 10 | 16 | 22.3 |
| 7/1/13 | 12/31/13 | 10 | 14.4 | 35 |
| 1/1/13 | 6/30/13 | 10 | 11.5 | 32.3 |
| 7/1/12 | 12/31/12 | 10 | 30.7 | 69.1 |
| 1/1/12 | 6/30/12 | 10 | 18.1 | 24.3 |
| 7/1/11 | 12/31/11 | 10 | 18.5 | 30.1 |
| 1/1/11 | 6/30/11 | 10 | 13.7 | 23.7 |
| 7/1/10 | 12/31/10 | 5 | 19.9 | 26.6 |
| 1/1/10 | 6/30/10 | 10 | 15.2 | 39 |
| 1/1/09 | 12/31/09 | 6 | 27.1 | 46.4 |

* According to individual samples reported in database, the 90th Percentile sample would be 6.5 ppb.

The Plum Point Water System collected samples for the current reporting period on September 12, 2017. The results for the five samples (ranked lowest to highest) were:

1. 1.1
2. 1.4
3. 3.2
4. 4.3
5. 6.7

Quitman County: Lead Monitoring Data for 14 Active Community PWS

| PWS | Pop. Served | Sample Size | Monitoring Period Begin | Monitoring Period End | 90 th Percentile (ppb) |
|----------------------------------|-------------|-------------|-------------------------|-----------------------|-----------------------------------|
| Big Field Water Association | 400 | 4 | 1/1/15 | 12/31/17 | 4.4 |
| Birdie Water Association | 165 | 5 | 1/1/15 | 12/31/17 | 2.3 |
| City of Marks | 2,446 | 10 | 1/1/17 | 12/31/17 | .6 |
| Darling Water Association | 300 | 5 | 1/1/17 | 12/31/17 | 4.5 |
| Norfleet Utilities | 80 | 5 | 1/1/15 | 12/31/17 | 1.4 |
| South Lake Water Association | 580 | 11 | 1/1/15 | 12/31/17 | 1.9 |
| South Quitman – N. Tutwiler Utl. | 182 | 3 | 1/1/15 | 12/31/17 | 2.1 |
| South Quitman – S. Lambert Utl. | 208 | 2 | 1/1/15 | 12/31/17 | .5 |
| South Quitman – West Crowder | 325 | 4 | 1/1/15 | 12/31/17 | 1 |
| Town of Crowder | 700 | 10 | 1/1/17 | 12/31/19 | 29.2 |
| Town of Falcon | 167 | 5 | 1/1/15 | 12/31/17 | 0 |
| Town of Lambert | 1,638 | 10 | 1/1/15 | 12/31/17 | .8 |
| Town of Sledge | 670 | 10 | 1/1/15 | 12/31/17 | 4.2 |
| West Lambert Water Association | 333 | 5 | 1/1/15 | 12/31/17 | 3.2 |

The following table contains sampling data for City of Marks since 2012, which reveals one period with a MCL exceedance. A 90th percentile concentrations below 1 ppb raises questions regarding the reliability of the sampling data. Of the 104 samples, almost 63% (65 samples) had concentration levels of .5 ppb. As mentioned above, this much consistency among samples would not be anticipated.

| Monitoring Period Begin | Monitoring Period End | Number of Samples | 90 th Percentile (ppb) | Highest Sample (ppb) |
|-------------------------|-----------------------|-------------------|-----------------------------------|----------------------|
| 1/1/17 | 12/31/17 | 10 | .6 | 1.5 |
| 7/1/16 | 12/31/16 | 20 | .9 | 1.2 |
| 1/1/16 | 6/30/16 | 20 | 1.4 | 16.1 |
| 7/1/15 | 12/31/15 | 21 | 1 | 7.6 |
| 1/1/15 | 6/30/15 | 21 | .6 | 7.9 |
| 1/1/12 | 12/31/14 | 12 | 20.7 | 32.8 |

The following table contains sampling data for Darling Water Association since 2012, which reveals one period with a MCL exceedance. Of the 50 samples, 18% (9 samples) had concentrations levels of .5 ppb.

| Monitoring Period Begin | Monitoring Period End | Number of Samples | 90 th Percentile (ppb) | Highest Sample (ppb) |
|-------------------------|-----------------------|-------------------|-----------------------------------|----------------------|
| 1/1/17 | 12/31/17 | 5 | 4.5 | 4.6 |
| 7/1/16 | 12/31/16 | 10 | 3.7 | 5.2 |
| 1/1/16 | 6/30/16 | 10 | 2.4 | 3 |
| 7/1/15 | 12/31/15 | 10 | 4 | 5 |
| 1/1/15 | 6/30/15 | 10 | 2.2 | 11.7 |
| 1/1/12 | 12/31/14 | 5 | 19 | 36 |

The Town of Crowder collected samples for the current reporting period on July 20, 2017. The results for the ten samples (ranked lowest to highest) were:

1. 10.3
2. 12.9
3. 13.4
4. 13.8
5. 15.4
6. 16.8
7. 17.3
8. 28.4
9. 29.3
10. 172.2

Sunflower County: Lead Monitoring Data for 14 Active Community PWS

| PWS | Pop. Served | Sample Size | Monitoring Period Begin | Monitoring Period End | 90 th Percentile (ppb) |
|-------------------------------|-------------|-------------|-------------------------|-----------------------|-----------------------------------|
| Big Yeager Water Association | 270 | 5 | 1/1/15 | 12/31/17 | 1.6 |
| City of Drew | 2,349 | 11 | 1/1/15 | 12/31/17 | 1.5 |
| City of Indianola | 10,683 | 30 | 1/1/14 | 12/31/16 | .7 |
| City of Ruleville | 3,000 | 11 | 1/1/14 | 12/31/16 | 2.2 |
| FMH Water Association #1 | 2,711 | 11 | 1/1/15 | 12/31/17 | .9 |
| MS State Penitentiary | 3,700 | 11 | 1/1/15 | 12/31/17 | 18.2 |
| Rome Water System | 234 | 5 | 1/1/15 | 12/31/17 | 1.6 |
| So. Sunflower W/A – Indianola | 258 | 5 | 1/1/15 | 12/31/17 | 2.4 |
| So. Sunflower W/A – Inverness | 882 | 10 | 1/1/15 | 12/31/17 | .8 |
| Sunflower Water Association | 498 | 5 | 1/1/15 | 12/31/17 | 23.4 |
| Town of Doddsville | 190 | 5 | 1/1/12 | 12/31/14 | .6 |
| Town of Inverness | 1,019 | 10 | 1/1/15 | 12/31/17 | 1 |
| Town of Moorhead | 2,063 | 11 | 1/1/15 | 12/31/17 | 1 |
| Town of Sunflower | 346 | 11 | 1/1/15 | 12/31/17 | 5.4 |

The MS State Penitentiary collected samples for the current monitoring period on September 26 and 27, 2017. The results for the eleven samples (ranked lowest to highest) were:

1. .5
2. .6
3. 1
4. 1.3
5. 1.5
6. 2.9
7. 4.4
8. 5.4
9. 7.6
10. 19.4
11. 127.4

The Sunflower Water Association collected samples for the current monitoring period on August 22, 2017. The results for the five samples (ranked lowest to highest) were:

1. .5
2. .7
3. 4.2
4. 13.9
5. 32.8

The Town of Sunflower collected samples for the current monitoring period on August 21 and 22, 2017. The results for the eleven samples (ranked lowest to highest) were:

1. .5
2. .5
3. .6
4. .7
5. 2.3

- 6. 3.1
- 7. 3.6
- 8. 4.8
- 9. 4.9
- 10. 5.4
- 11. 6.7

Tallahatchie County: Lead Monitoring Data for 16 Active Community PWS

| PWS | Pop. Served | Sample Size | Monitoring Period Begin | Monitoring Period End | 90 th Percentile (ppb) |
|-----------------------------------|-------------|-------------|-------------------------|-----------------------|-----------------------------------|
| Blue Cane, Cowart & Tippto W/A | 1,472 | 10 | 1/1/15 | 12/31/17 | 8.3 |
| Brazil-Sumner Water Association | 390 | 5 | 1/1/15 | 12/31/17 | 2.2 |
| Cascilla Water Association | 831 | 10 | 1/1/15 | 12/31/17 | 4.7 |
| Charleston Utilities | 3,112 | 22 | 1/1/15 | 12/31/17 | 1.5 |
| East Charleston Water Association | 192 | 5 | 1/1/17 | 12/31/19 | 16.8 |
| North Tallahatchie W/A | 3,299 | 10 | 1/1/15 | 12/31/17 | 1.5 |
| Paynes Water Association | 525 | 6 | 1/1/15 | 12/31/17 | 2.4 |
| Philipp Water Association | 621 | 10 | 1/1/15 | 12/31/17 | 2.4 |
| South Quitman – East Tutwiler | 39 | 5 | 1/1/12 | 12/31/14 | 1.3 |
| South Quitman – South Tutwiler | 94 | 3 | 1/1/15 | 12/31/17 | 1.7 |
| Town of Sumner | 368 | 5 | 1/1/15 | 12/31/17 | 1.2 |
| Town of Tutwiler | 1,150 | 11 | 1/1/15 | 12/31/17 | 1.4 |
| Town of Webb | 657 | 10 | 1/1/15 | 12/31/17 | .5 |
| Village of Glendora | 161 | 6 | 1/1/13 | 12/31/15 | 0 |
| W. Tallahatchie – Hwy S/D | 92 | 5 | 1/1/15 | 12/31/17 | 1 |
| W. Tallahatche Utl. Assn. | 673 | 11 | 1/1/15 | 12/31/17 | 0 |

The Blue Cane, Cowart & Tippto W/A collected samples for the current monitoring period on July 25 and 27, 2017. The results for the ten samples (ranked lowest to highest) were:

- 1. .5
- 2. .6
- 3. .7
- 4. .9
- 5. .9
- 6. 1.3
- 7. 1.8
- 8. 2.3
- 9. 8.3
- 10. 8.3

The East Charleston Water Association collected samples for the current monitoring period on July 25, 2017. The results for the five samples (ranked lowest to highest) were:

- 1. .5
- 2. .5
- 3. .5
- 4. 1.1
- 5. 32.4

Washington County: Lead Monitoring Data for 14 Active Community PWS

| PWS | Pop. Served | Sample Size | Monitoring Period Begin | Monitoring Period End | 90 th Percentile (ppb) |
|--|-------------|-------------|-------------------------|-----------------------|-----------------------------------|
| Black Bayou Water Assn. | 3,216 | 10 | 1/1/15 | 12/31/17 | 0 |
| City of Greenville | 34,400 | 30 | 1/1/14 | 12/31/16 | 1.9 |
| City of Greenville (Airbase) | 25 | 5 | 1/1/15 | 12/31/17 | 3.7 |
| City of Hollandale | 2,702 | 10 | 1/1/14 | 12/31/16 | 1 |
| City of Leland | 4,425 | 21 | 1/1/14 | 12/31/16 | 10.7 |
| Darlove-Murphy Water Assn. | 256 | 6 | 1/1/12 | 12/31/14 | 1.6 |
| Glen Allan Water Association | 628 | 10 | 1/1/15 | 12/31/17 | 1 |
| Golding Acres Water Association | 96 | 5 | 1/1/15 | 12/31/17 | 2 |
| Raskin Enterprises LLC – Delta Village MHP | 425 | 5 | 1/1/15 | 12/31/17 | .3 |
| Swiftwater Dev. Assn, Inc. | 816 | 7 | 1/1/15 | 12/31/17 | 3.1 |
| Town of Arcola | 546 | 11 | 1/1/15 | 12/31/17 | 2.1 |
| Town of Metcalfe | 1,067 | 11 | 1/1/15 | 12/31/17 | 1.1 |
| Wayside Water Association | 1,803 | 10 | 1/1/15 | 12/31/17 | 5.7 |
| Winterville Water Association | 145 | 5 | 1/1/17 | 12/31/17 | 1.3 |

The City of Leland collected samples for the current monitoring period on August 9 and 10 and September 28, 2016. The results for the 21 samples (ranked lowest to highest) were:

1. .5
2. .5
3. .5
4. .5
5. .6
6. .8
7. .8
8. 1
9. 1.2
10. 1.3
11. 1.3
12. 1.6
13. 1.6
14. 2
15. 2.6
16. 4.4
17. 4.4
18. 11.4
19. 15.1
20. 38.1

The Wayside Water Association collected samples for the current monitoring period on July 27 and 28, 2017. The results for the ten samples (ranked lowest to highest) were:

1. .5
2. .6
3. .7

4. .7
5. 1
6. 1.1
7. 1.2
8. 1.2
9. 5.7
10. 15.1

The following table contains sampling data for the Winterville Water Association since 2012. There were no exceedances of the lead MCL and the 90th percentile result is consistently below 5 ppb. There was an exceedance of the copper MCL during the 1/1/2012 – 12/31/2014 monitoring period that triggered the return to standard monitoring.

| Monitoring Period Begin | Monitoring Period End | Number of Samples | 90 th Percentile (ppb) | Highest Sample (ppb) |
|-------------------------|-----------------------|-------------------|-----------------------------------|----------------------|
| 1/1/17 | 12/31/17 | 5 | 1.3 | 1.7 |
| 7/1/16 | 12/31/16 | 10 | 1.5 | 1.9 |
| 1/1/16 | 6/30/16 | 10 | 1 | 4.5 |
| 7/1/15 | 12/31/15 | 10 | 3 | 5 |
| 1/1/15 | 6/30/15 | 10 | 1.8 | 2.4 |
| 1/1/12 | 12/31/14 | 5 | 1 | 1 |

VII. Challenges and Gaps

A. Infrastructure

There are several infrastructure issues related to the risk of lead exposure through drinking water. As mentioned in the introduction, for example, individuals consuming water from private wells are not protected by the procedures for PWSs under the LCR. Furthermore, the age of houses and water delivery systems can be a huge problem, as both the Jackson, Mississippi and Flint, Michigan case studies reveal. Little is known about the contribution of lead pipes and water treatment to lead poisoning in the state of Mississippi. The use of lead pipes in PWSs and residential plumbing was banned in 1986. Federal law, however, did not require the removal or replacement of existing lead service lines. Homes and drinking water systems built before 1986 are therefore likely to have lead pipes and an increased risk of lead contamination.

According to the U.S. Census Bureau’s American Community Survey, 70% of the current housing stock in the U.S. was built before 1989.⁷⁰ The housing stock in the Mississippi Delta is slightly older. In some counties, pre-1989 structures account for over 80% of the housing stock.⁷¹ Given the age of housing in the region and lack of resources to upgrade public infrastructure, drinking water may be a significant contributing factor to childhood lead poisoning.

⁷⁰ U.S. Census Bureau, American Community Survey, <https://www.census.gov/programs-surveys/acs/> (last accessed October 27, 2016)

⁷¹ *Id.*

The LCR requires PWSs to conduct an evaluation of pipes and plumbing materials within their distribution systems to inform the development of LCR sampling plans. In February 2016, the EPA encouraged states to increase transparency in LCR implementation by, among other things, working with PWSs to make these materials inventories publicly available. In response, the MSDH's Bureau of Public Water Supply has stated that it will require all PWSs subject to the LCR to annually submit a material inventory or map of lead service lines and lead plumbing.⁷²

Further, the EPA has released a LCR Revisions White Paper⁷³ that reinforces the requirement that PWSs update their distribution system materials inventory to identify the number and location of lead service lines in their system and identify and evaluate incentive and creative funding mechanisms related to the use of Drinking Water State Revolving Fund. Complying with this directive will be difficult for many PWSs within Mississippi as federal law did not expressly require the retention of records related to the LCR materials inventory. Many PWSs, therefore, may have little to no information regarding the location of lead materials within their distribution systems.

Finally, the 2016 WINN Act amendments to the SDWA directed the EPA to develop a grant program to aid activities or projects that would reduce the amount of lead in drinking water, including replacing lead service lines. In particular, the EPA must give priority to funding to disadvantaged communities to help address lead action level exceedances or issues at schools and day care facilities.⁷⁴

B. Lack of Testing in Schools

While the SDWA and LCR regulates the amount of lead in public water supplies, there is a lack of regulation when it comes to water in schools. The SDWA and LCR only require those schools that qualify as a PWS to test their water supplies for lead. Considering the age of a great percentage of school buildings, as well as the vulnerability of children to lead poisoning, this is a gaping hole in the legal framework. In addition, because there is such a small record of testing compared to the number of schools throughout the nation and in Mississippi, it is hard to estimate how much money would be needed to address the threat of lead in schools' drinking water. Many schools face serious issues with respect to lead contamination of drinking water supplies. In recent years, news stories from around the country have highlighted concerns in Newark, Boston, Baltimore, Detroit, and Seattle, in addition to many other localities.

Mississippi has a handful of schools that test their water supplies for lead under the LCR. Although a search of the sampling results from the previous ten years did not reveal any lead levels above the MCL, a handful of schools did have lead levels above 5 ppb or 0.005 mg/L.

⁷² Craig, J. Mississippi State Department of Health. Letter dated March 29, 2016 to Mr. Joel Beauvais, Deputy Assistant Administrator, Office of Water, US EPA.

⁷³ Environmental Protection Agency, Lead and Copper Rule Revisions White Paper (2016), *available at* https://www.epa.gov/sites/production/files/2016-10/documents/508_lcr_revisions_white_paper_final_10.26.16.pdf

⁷⁴ SDWA Section 1459B.

| School | County | Testing Period | Lead Level (ppb) |
|-------------------------|----------|---------------------|------------------|
| Delisle Elementary | Harrison | 1/1/2012-12/31/2014 | 8 |
| Delisle Elementaty | Harrison | 1/1/2009-6/30/2009 | 7.7 |
| Diberville High School | Harrison | 1/1/2010-12/31/2010 | 9.3 |
| Galena School | Marshall | 1/1/2008-12/31/2008 | 10.2 |
| HW Byers High School | Marshall | 1/1/2012-12/31/2012 | 5.1 |
| HW Byers High School | Marshall | 1/1/2010-6/30/2010 | 5.8 |
| HW Byers High School | Marshall | 7/1/2009-12/31/2009 | 14.5 |
| HW Byers High School | Marshall | 1/1/2009-6/30/2009 | 14.5 |
| St. Patrick High School | Harrison | 1/1/2012-12/31/2014 | 13.3 |

The EPA has developed a voluntary lead testing program for schools, referred to as the 3T program. The 3Ts represent training, testing, and telling. The EPA has developed a manual for this program “to help schools minimize their students’ and staffs’ exposure to lead in drinking water.”⁷⁵ It should be noted that the testing protocols under the 3T program are different than those mandated for PWS under the LCR. EPA notes that this difference is due to the fact that the LCR is meant to identify system-wide problems, while the 3T testing is meant to identify specific sources in a school that have lead problems. Further, the action level for 3T testing is 20 ppb,⁷⁶ which is less protective than the LCR action level of 15 ppb.

Section 2017 of the 2016 WINN Act requires the EPA to develop a voluntary testing program for lead levels “in drinking water at schools and child care programs under the jurisdiction of local education agencies (LEAs).”⁷⁷ Under this provision, either the state or the LEA can apply for grants. Congress authorized that \$20 million could be appropriated per year from FY 2017 to FY 2021 for this program.

C. Lack of Public Awareness

In addition to the challenges and gaps above, U.S. residents seem to have a lack of knowledge concerning how lead levels in drinking water are regulated in the United States. This lack of knowledge stems from a variety of factors, including what households are covered by the SDWA, what the SDWA actually requires, and lack of attention to CCR reports.

Since the Flint water crisis and the lead issues in Jackson, Mississippi, the National Sea Grant Law Center and its project partners, the University of Mississippi School of Pharmacy and Center for Population Studies, has been providing outreach on the provisions of the SDWA and LCR, and how these provisions effect the water quality of individual homes. The project team has also been working to identify communities at risk in the Mississippi Delta at risk of lead contamination through the public water supply. These presentations and interactions with

⁷⁵ EPA, 3Ts for Reducing Lead in Drinking Water in Schools: Revised Guidance 4 (2006), available at https://www.epa.gov/sites/production/files/2015-09/documents/toolkit_leadschools_guide_3ts_leadschools.pdf.

⁷⁶ *Id.* at 12.

⁷⁷ Congressional Research Service, Safe Drinking Water Act (SDWA): A Summary of the Act and its Major Requirements 11 (2017).

homeowners have revealed a lack of knowledge or awareness among homeowners of the following facts:

- Exclusion of private wells from protections of the SDWA;
- LCR's focus on identifying problems with the water system as a whole, not at individual homes;
- 90th percentile concentration reporting requirement that can mask MCL exceedances at individual homes; and
- No requirement that a lead level exceedance at an individual residence detected through PWS sampling be remediated

In addition, homeowners seem to be unaware of actions that they can take to protect themselves from lead exposure at their homes. Homeowners, for instance, can purchase a filter certified to remove lead for their main drinking water faucet. Further, homeowners in Mississippi can contact the MSDH for a lead testing kit, and then send in the kit to the state lab for testing. Currently the MSDH charges homeowners \$15 for this service.⁷⁸

⁷⁸ More information on this program can be found at <http://msdh.ms.gov/msdhsite/handlers/printcontent.cfm?ContentID=17370&ThisPageURL=http%3A%2F%2Fmsdh.ms.gov%2Fmsdhsite%2Findex.cfm%2F23%2C0%2C195%2C720%2Chtml&EntryCode=17370&GroupID=23>.