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REPORT

WHAT'S IN YOUR WATER? FLINT AND BEYOND

ANALYSIS OF EPA DATA REVEALS WIDESPREAD LEAD CRISIS POTENTIALLY AFFECTING MILLIONS OF AMERICANS

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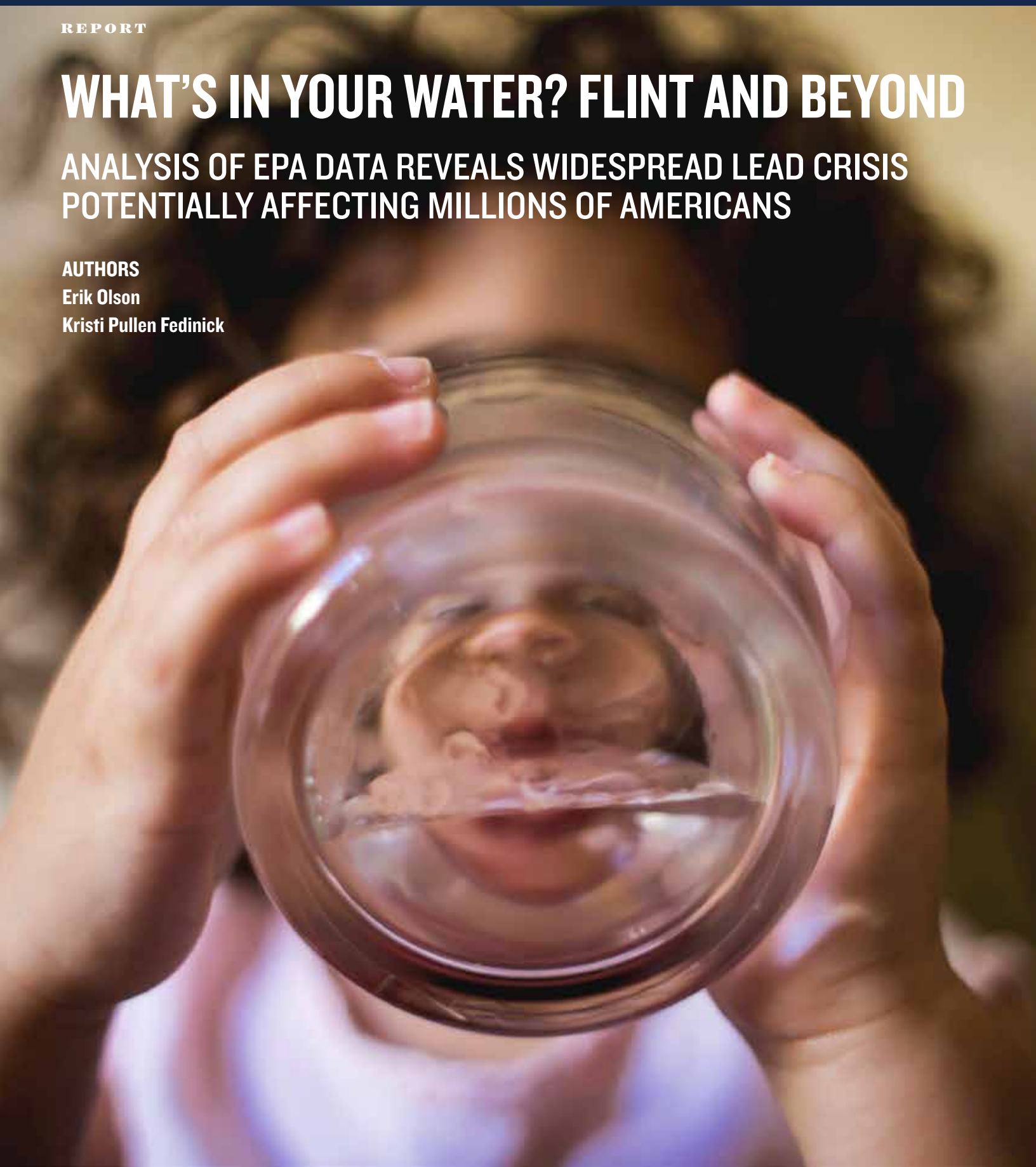

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About NRDC

The Natural Resources Defense Council is an international nonprofit environmental organization with more than 2.4 million members and online activists. Since 1970, our lawyers, scientists, and other environmental specialists have worked to protect the world's natural resources, public health, and the environment. NRDC has offices in New York City, Washington, D.C., Los Angeles, San Francisco, Chicago, Montana, and Beijing. Visit us at nrdc.org.

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Executive Summary

WHAT HAPPENED IN FLINT?

The devastating lead contamination of the tap water in Flint, Michigan—a majority African American city with a poverty rate above 40 percent—has become a full-blown national scandal. In 2014, a state-appointed emergency manager decided to switch from the Lake Huron–supplied water from Detroit's water system to the highly corrosive and polluted water from the Flint River, without treatment to control the corrosion of lead pipes. Soon, citizens complained about dark-colored, foul-tasting, smelly water that residents say caused skin rashes and hair loss. Lead levels in the water also skyrocketed; independent tests found levels at double the "action level" for lead set by the U.S. Environmental Protection Agency (EPA)—and in some cases many times worse than that.[1] As citizens increasingly voiced their concerns, state officials were "callous and dismissive," according to a recent report by the independent Flint Task Force, which was established by the governor in October 2015.[2]

Flint illustrates the broader problem of environmental injustice—meaning the disproportionate exposure of lower-income communities and communities of color to environmental hazards.

WHY IS LEAD SO HARMFUL?

No amount of exposure to lead is safe. The goal is to allow no exposure to lead at all, especially for children, who are both more susceptible to lead poisoning and suffer more severe impacts. Even at very low levels once considered safe, lead can cause serious, irreversible damage to the developing brains and nervous systems of babies and young children.[3] Lead can decrease a child's cognitive capacity, cause behavior problems, and limit the ability to concentrate—all of which, in turn, affect the ability to learn in school.[4] Children with serious lead-related brain impacts are less likely to graduate from high school and more prone to delinquency, teen pregnancy, violent crime, and incarceration.[5]

The World Health Organization (WHO) notes that "the consequences of brain injury from exposure to lead in early life are loss of intelligence, shortening of attention span and disruption of behaviour. Because the human brain has little capacity for repair, these effects are untreatable and irreversible. They cause diminution in brain function and reduction in achievement that last throughout life."[6] However, certain interventions after exposure, such as additional educational and nutritional support, may help to reduce the longer-term impacts.[7]

Among pregnant women, lead exposure can cross the placental barrier of the womb and harm the fetus.[8] As the Centers for Disease Control and Prevention (CDC) notes, "Even low-level lead exposures in developing babies have been found to affect behavior and intelligence. Lead exposure can cause miscarriage, stillbirths, and infertility (in both men and women)."[9] Even in otherwise healthy adults, lead exposure can cause adverse cardiovascular and kidney effects, cognitive dysfunction, and elevated blood pressure.[10]

Pictured from left to right are a lead pipe, a corroded steel pipe, and a lead pipe treated with protective orthophosphate. Orthophospate creates a film coating inside of lead pipes that can act as a barrier, reducing at least somewhat the amount of lead that gets into tap water.

FLINT HIGHLIGHTS THAT THE U.S. DRINKING WATER PROGRAM AND LEAD RULES ARE INADEQUATE

Flint's water crisis highlights potentially disastrous gaps in the provision of safe drinking water to all people, especially the most vulnerable. These shortcomings are complex, far-reaching, and unacceptable and include poor and unaccountable decision-making by public officials as well as deficiencies in the Safe Drinking Water Act and the Lead and Copper Rule, the EPA's standard under the Act. Weak regulatory language and poor implementation and enforcement of the Lead and Copper Rule at the federal and state levels are at the heart of the problem.

The state of Michigan bears responsibility for its harmful decisions regarding Flint, and for neglecting its primary enforcement responsibilities. However, the EPA also failed to act promptly and appropriately to execute its obligations under the Safe Drinking Water Act. In fact, NRDC and the American Civil Liberties Union of Michigan (ACLU-MI) served upon EPA a petition on behalf of Flint residents on October 1, 2015, requesting an intervention many months before the agency issued an administrative order on January 21, 2016, directed at city and state officials.[11] Ultimately, NRDC and ACLU-MI also filed litigation on behalf of local citizens in an effort to address Flint's water woes.

Flint illustrates the broader problem of environmental injustice—meaning the disproportionate exposure of lower-income communities and communities of color to environmental hazards. For more than a year, government officials callously downplayed or ignored Flint's toxic water and the majority-black community's cries for help. Federal EPA, state, and state-appointed local environmental officials belittled and refused to listen to Flint residents and their advocates. NRDC recommends ensuring that citizens have a seat at the table to make decisions about their drinking water, especially when it is obvious that their public officials won't protect them.

While a full evaluation of the broader environmental justice implications of lead-contaminated drinking water is beyond the scope of this report, NRDC is analyzing data on lead and other drinking water contaminants to assess the degree to which low-income communities and communities of color are disproportionately impacted by drinking water contamination. A detailed report on this subject is forthcoming.

FLINT IS NOT ALONE: OVER 18 MILLION PEOPLE WERE SERVED BY SYSTEMS VIOLATING THE LEAD AND COPPER RULE IN 2015

While Flint represents a clear case of extreme lead contamination, it does not have a monopoly on serious lead problems. In order to evaluate the national extent of violations of the Lead and Copper Rule, NRDC has obtained official EPA violation and enforcement records. We have conducted extensive data analysis, using geographic information system (GIS) mapping software to highlight and map the scope of lead-related issues in drinking water systems across the United States.

Our analysis indicates that in 2015, over 18 million people were served by 5,363 community water systems that violated the Lead and Copper Rule.[i] These violations included failures to properly test the water for lead or conditions that could result in lead contamination, failures to report contamination to state officials or the public, and failures to treat the water appropriately to reduce corrosion. (See figures 1 and 2 for locations of these violations.) Additionally, in 2015, 1,110 community water systems serving 3.9 million people showed lead levels in excess of 15 parts per billion (ppb) in at least 10 percent of the homes tested, the action level established for lead under the Lead and Copper Rule (see figure 3).[ii] Figures 1, 2, and 3 highlight the extraordinary geographic scope of Lead and Copper Rule violations and lead action level exceedances.[iii]

It may be surprising to many that the EPA's database does not list Flint among the systems in violation of the Lead and Copper Rule. In fact, despite the headlines and national outrage, Michigan's Department of Environmental Quality (MDEQ) apparently still has not officially reported Flint to be in violation of the Lead and Copper Rule. At the same time, the Michigan attorney general's recent criminal indictments of state and local officials who had a hand in the Flint crisis certainly acknowledge that the Rule was violated.[12] In addition, many lead violations across the country have undoubtedly been hidden by intentional use of monitoring techniques that avoid detecting lead problems—techniques that the EPA long allowed to continue unabated.[13] The EPA issued a guidance document on February 29, 2016, saying three of these methods should not be used, after years of pressure to stop these practices.[14]

NRDC has documented underreporting problems in the EPA's drinking water database for 25 years; the EPA itself admits that "audits and assessments have shown that violation data [in the EPA's database] are substantially incomplete.

Underreporting of violations in the EPA's database can be attributed to a variety of causes. Sometimes, public water systems fail to properly monitor their water (e.g., by using testing methods or strategies that avoid detecting contamination, as was the case in Flint), so violations are not recorded and reported. In other cases, states fail to correctly document violations. States also fail to report known violations into the EPA's database as required by federal law. As highlighted by the Michigan attorney general's criminal charges against state and city officials for allegedly failing to accurately report Flint's lead problems, reporting failures may hide serious health threats.

NRDC has documented underreporting problems in the EPA's drinking water database for 25 years; the EPA itself admits that "audits and assessments have shown that violation data are substantially incomplete."[15,16] In 2004, an in-depth investigation by *The Washington Post* documented dozens of instances of utilities providing water with high lead levels that were not reported as violating the Lead and Copper Rule.[17] Therefore, the widespread violations evidenced by the EPA's data and the maps contained in this report reflect only a subset of a serious and likely much bigger lead problem.

i Following methods used by EPA, we count violations as occurring in 2015 if they initially occurred in that year, or if they initiated in a previous year but EPA still considered them "open" (i.e. unresolved) by the end of 2015. This is how EPA generally counts violations in its reporting under the Government Performance & Results Act and its ECHO (Environmental Compliance History Online) database. Even if we limit the "open" violations to those that first occurred between January 1, 2013 and December 31, 2015, there were still 12,538,849 people served by 3,314 violating systems.

ii We include as lead action level exceedances all systems that had lead levels recorded as exceeding the action level in 2013-2015, which includes systems with exceedances that initiated prior to January 1, 2013. If we limit the data to include only water systems with an action level exceedance that began on or after January 1,2013, 3.2 million people were served by 758 systems exceeding the lead action level.

iii It should be noted that not everyone served by a water system that is violating the Lead and Copper Rule or exceeding the lead action level is necessarily drinking water containing excessive lead. Data are not available to show what percentage of customers have excessive lead in their water.

NEARLY 90 PERCENT OF LEAD AND COPPER RULE VIOLATIONS ARE NOT SUBJECT TO FORMAL ENFORCEMENT

The lack of enforcement in Flint was not anomalous. In fact, according to the EPA's data, states and the EPA took formal enforcement action against just 11.2 percent of the over 8,000 violations that occurred in 2015—leaving 88.8 percent free from any formal enforcement action.[iv] Formal enforcement actions were taken against less than one in five health-based violations (17.6 percent). Furthermore, penalties were sought or assessed for only a tiny fraction (3 percent) of violations.[v] This lack of accountability sends a clear message to water suppliers that knowingly violate the Lead and Copper Rule, with state and federal complicity: There is no cop on the beat.

In the Flint lead crisis (from 2014 to the present) and previously in Washington, D.C. (from 2001 to 2004), the EPA failed to act, downplayed the problem, and emboldened the actions of some water systems and primacy agencies. These experiences and the data showing widespread lack of enforcement highlight a need for a culture change at the EPA and among state regulatory bodies to ensure that violations are taken seriously and public health threats are addressed promptly.

WHAT DO WE DO NOW?

Corrective action is long overdue. First and foremost, Flint's water infrastructure—in particular thousands of lead service lines (the lead pipes that connect water mains in the street to residences) and any badly corroded pipes and fittings—must be replaced immediately. Safe, reliable water must be supplied to Flint residents in the meantime. Flint must also ensure that those who have been exposed to lead are carefully tracked and that they receive the support they need, now and in the future.

Next, we need significant investment in national water infrastructure. This will address urgent public health needs and create well-paid jobs. Necessary water infrastructure improvements include replacing the more than six million lead service lines nationwide, replacing or repairing decaying or outdated parts of distribution systems, and improving drinking water treatment plants. Professional civil engineers estimate that we need at least $1 trillion over the next 25 years to bring our infrastructure to functionality. The current congressional funding of $2.37 billion per year for drinking water and clean water infrastructure funds is paltry at best and should at least be restored to the approximately $8 billion per year stipulated under the 2009 American Recovery and Reinvestment Act.[18]

Flint's crisis is unusual and disturbing because those responsible for creating the problem were caught only because of an unlikely coalition of strong, well-organized local citizens and a physician, who brought in outside experts to help document and expose the problem and fight the EPA and the MDEQ.

While replacing this infrastructure is critical, we also must set about fortifying our legislation and rules to protect against future "Flints." Flint's crisis is unusual and disturbing because those responsible for creating the problem were caught only because of an unlikely coalition of strong, well-organized local citizens and a physician, who brought in outside experts to help document and expose the problem and fight the EPA and the MDEQ. We cannot expect such an unlikely set of watchdogs to emerge in the face of every lead crisis.

The EPA's Lead and Copper Rule—including its weak language, implementation, and enforcement—needs a major overhaul. The Rule must be amended to: (1) require the full replacement of all lead service lines; (2) more fully and fairly monitor lead levels, and prohibit water systems from using testing strategies that circumvent the detection or reporting of lead contamination; and (3) require clear, ongoing, timely, and culturally appropriate public education and notification of lead problems. Furthermore, at the state and federal levels, resources for the enforcement of the Safe Drinking Water Act have been decimated by poor funding, lack of management support, and bureaucratic indifference or fear of recrimination by the EPA. This fear may be partially due to haranguing by many members of the congressional leadership who have continually criticized the EPA for supposedly overzealous regulation and enforcement. These resources must be restored, and members of Congress should recognize that it is the EPA's job to enforce the law.

iv Following methods used by EPA, we count violations as occurring in 2015 if they initially occurred in that year, or if they initiated in a previous year but EPA still considered them "open" (i.e. unresolved) by the end of 2015. If we limit the "open" violations to those first occurring on or after January 1, 2013, an even lower percentage of the violations recorded (6.3 percent) were subject to formal enforcement.

v It should be noted that often states (or in rare cases the EPA) will take what they call "informal enforcement" actions, such as sending a letter or calling an offending water system. The EPA reports that in 76.3 percent of violations and 75.7 percent of health-based violations, at least an informal action such as a call or letter occurred. However, in the case nearly 2,000 violations (including health-based violations) not even informal action was taken. And importantly, as is discussed above, such "informal" actions often failed to bring systems back into compliance. The lack of formal enforcement sends a clear signal that breaking the law is unlikely to result in meaningful enforcement or penalties.

Additionally, drinking water in schools, day care centers, and other public locations frequented by young children must be tested for lead. A federal law passed in 1988 requiring water testing in schools and day care centers for lead was struck down by a court ruling that a drafting error rendered it unconstitutional.[19] The error was never corrected. This law should be fixed, and water fountains should be tested and those that are found to supply lead-contaminated water should be repaired or replaced.

As long as we have this culture of hiding violations and attacking staff members who do their jobs, more Flints can be expected.

As mentioned earlier, a cultural change at the EPA and in some state regulatory agencies is ultimately needed. For example, Miguel Del Toral, an EPA staffer in the Chicago regional office, blew the whistle on Flint's lead problem in early 2015. Del Toral visited the city to test the water and wrote a detailed report in June 2015 highlighting the city's water problems. Rather than receiving accolades for doing his job well, he was chastised and labeled a "rogue employee."[20] MDEQ staff worked to undermine Del Toral and declined for many months to address Flint's serious water problems. As of June 2016, the DEQ has failed to initiate any enforcement action in Flint. The state attorney general's criminal enforcement action against a few DEQ and city employees, taken after a special prosecutor's investigation, is important and helpful. But it does not remedy the underlying lack of enforcement emphasis within the responsible agencies. As long as we have this culture of hiding violations and attacking staff members who do their jobs, more Flints can be expected.

In the meantime, the Safe Drinking Water Act should be amended so that citizens whose water may present an imminent and substantial health threat are authorized to immediately sue for relief. They should not have to wait for state or federal officials to act.

Last, the EPA and state environmental officials must take environmental justice concerns seriously and prioritize them when it comes to all permits, enforcement, resource allocation, and regulatory protections. The EPA, states, and local officials should focus on empowering local communities and ensuring that they participate in decisions about their drinking water. We need a community-participatory model, in which community members are included in respectful, inclusive, and open discussions of local drinking water problems and infrastructure needs. Only with such broad participation can we ensure community buy-in and, ultimately, full protection of the health of our citizens.

How Did We Get Here? Road Map to the Flint Water Crisis

How did so much lead end up in the tap water in Flint? Independent investigators agree on the basic facts.[21] In 2014, Flint stopped using the water from the Detroit water system, which is supplied by Lake Huron and which Flint had been using for more than 40 years. Detroit's water is treated with corrosion inhibitors, which reduce the amount of lead released into water from pipes, solder, and other plumbing components.[22] These chemicals coat the inside of water pipes with a thin film to prevent or mitigate the amount of lead that water leaches the water from leaching from lead pipes and other lead-containing plumbing components underground or in homes. In an effort to save money (by most accounts, a few million dollars over several years), state-appointed officials decided to begin using the Flint River as a drinking water source.[vi]

MICHIGAN'S EMERGENCY MANAGER LAW

The officials who switched Flint's water supply were appointed under a controversial state law that authorizes the governor to appoint an "emergency manager" to run local government functions in a municipality in financial distress. Flint had been experiencing population and revenue loss for many years and state officials considered it to be in financial distress. In 2011, Governor Rick Snyder signed an emergency manager statute into law (it was a substantially more draconian version of a previous Michigan statute), but it was overridden by a majority of Michigan voters in a 2012 referendum.[23] A month later, the state legislature adopted and Governor Snyder signed an emergency manager law very similar to the one the state's voters had just rejected—except with a controversial provision ensuring that it could not be overridden by voters in a referendum.[24] Under that revised law, Governor Snyder appointed the Flint emergency managers.

In a serious misjudgment and violation of the federal Safe Drinking Water Act, water from the polluted Flint River was piped into the city's water system—without treatment to control corrosion of lead plumbing fixtures.[25] In addition, some of the water was contaminated by *E. coli* bacteria, triggering a violation of the EPA's drinking water standard for coliform bacteria and a local boil-water advisory. To address the bacterial contamination, Flint officials overcompensated with chlorine disinfection, triggering a violation of the health standard for total trihalomethanes, a class of cancer-causing chemicals that are created when chlorine reacts with organic matter in water.[26] By August 2014, the Genesee County Health Department, which includes Flint, told Flint Public Works officials that legionellosis (Legionnaires' Disease) had been increasing since April 2014. They also mentioned the possible relationship between this outbreak and the decision to use the Flint River as the water supply. State Department of Health and Human Services epidemiology staff also expressed concern, but no further state-level evaluation of the problem followed, according to an independent investigation by the Flint Water Advisory Task Force.[27]

After the water switch, Flint citizens began complaining about foul-tasting brown water. Consumer allegations of rashes, hair loss, and illnesses started pouring into city offices.[28] While lead is not likely to cause rashes or hair loss, other contaminants in the water could be, and some local doctors reportedly attributed these problems to the water.[29] However, the cause of these issues has not been publicly addressed by state or local officials. The local General Motors plant stopped using city water in October 2014 because it was corroding auto parts, and state officials in Flint quietly began using bottled water in their local offices in January 2015.[30]

After the water switch, Flint citizens began complaining about foul-tasting brown water. Consumer allegations of rashes, hair loss, and illnesses started pouring into city offices.

Yet state officials publicly denied any health risk and dismissed concerned citizens as troublemakers. Local citizens invited researchers from Virginia Polytechnic Institute and State University (popularly known as Virginia Tech), who had established a national reputation for rigorous independent evaluation of lead contamination in drinking water, to check lead levels in the water. The researchers found high lead levels in many residents' taps, and it became clear that a lack of corrosion control by the water system was the cause. Thousands of lead service

vi This report uses several terms of art to describe systems that supply drinking water. Briefly, a "public water system" (or "drinking water system" or simply "water system") serves piped drinking water to at least 15 service connections or 25 or more people. SDWA §1401(4), 42 U.S.C. §300f(4). A "community water system" is a type of public water system that regularly serves the same customers year-round, while a "non-community water system" is a public water system that serves different people at different times or operates only part of the year (such as a factory, school, or campground's own water system). *See* EPA, "Information About Public Water Systems," available online at www.epa.gov/dwreginfo/information-about-public-water-systems.

lines—pipes that connect the city water mains under the street to residences—are still used in Flint. Corrosive water was leaching lead from these service lines (and probably also, in some cases, from lead pipes or lead-containing brass fixtures or lead solder in homes), due to the lack of corrosion control and damage to the protective film that had coated the inside of the pipes.

The EPA was aware of the lead issue in Flint at least as early as February, 2015, when water sampling showing a high lead level at a Flint home was brought to EPA's attention. Miguel Del Toral, an EPA staffer from the regional office in Chicago, which is responsible for overseeing the Michigan drinking water program, emailed state officials expressing concern about the lack of corrosion control. He visited Flint to investigate in April 2015 and wrote a detailed interim report in June 2015.[31] Del Toral's report, which later became public, noted the elevated lead levels in tap water samples taken by Virginia Tech in the home of Lee-Anne Walters, a concerned Flint citizen who helped to ring the alarm bell and has since been labeled a "hero mom."[32] Del Toral's report highlighted the lack of corrosion control and the violation of the EPA's Lead and Copper Rule in Flint, as well as the coliform and total trihalomethanes violations. The report and Del Toral's subsequent efforts to protect the public in Flint led to a reported effort by EPA Regional Administrator Susan Hedman (now resigned) and Michigan officials to counterattack and seek to gag this commendable EPA employee.[33]

The EPA was aware of the lead issue in Flint at least as early as February, 2015, when water sampling showing a high lead level at a Flint home was brought to EPA's attention.

In August and September 2015, Virginia Tech researchers published the results of hundreds of tap water tests completed in Flint, showing lead levels that far exceeded those reported by state officials. Indeed, according to the Virginia Tech scientists,

> "Flint's 90th [percentile] lead value is 25 ppb [parts per billion] in our survey. This is over the EPA allowed level of 15 ppb that is applied to high-risk homes. This is a serious concern indeed. Several samples exceeded 100 ppb, and one sample collected after 45 seconds of flushing [that is, collected after enough water had been flushed through the household plumbing to make it likely that the water being tested came from the lead service line outside the home] exceeded 1,000 ppb."[34]

In response to concerns about lead in the tap water, local pediatrician Mona Hanna-Attisha and some colleagues independently evaluated the blood lead levels of children in Flint in September 2015. They collected blood samples at her hospital, the Hurley Medical Center, whose laboratory runs blood lead tests for most Genesee County children.[35] Dr. Hanna-Attisha's results were astonishing. She found that the percentage of Flint's kids who suffered from elevated blood lead levels had *doubled* since the water supply was switched from Lake Huron to the Flint River. Furthermore, in areas with known high lead levels in water, the percentage of kids with elevated blood lead levels jumped by more than two and a half fold.[36]

The Virginia Tech findings and Dr. Hanna-Attisha's results were publicly announced immediately, but state officials voiced skepticism about their accuracy. Indeed, these officials attacked the credibility of the independent researchers. As the independent Task Force would later report:

> "Throughout 2015, as the public raised concerns and as independent studies and testing were conducted and brought to the attention of MDEQ, the agency's response was often one of aggressive dismissal, belittlement, and attempts to discredit these efforts and the individuals involved. We find both the tone and substance of many MDEQ public statements to be completely unacceptable."[37]

We now know that lead levels over 30 ppb (double the EPA's 15 ppb action level for lead) and in some cases *more than 100 ppb* were detected in Flint's tap water.[38] For many months, state and some local officials insisted publicly that the water was perfectly safe to drink and attacked those who questioned their reassurances. But it is now clear that state and federal officials were aware that much of Flint's tap water was loaded with toxic lead and were not accurately reporting the facts to the public.

On October 1, 2015, after being invited to help Flint citizens address local drinking water contamination problems, NRDC served a formal petition upon the EPA requesting that the agency issue an emergency order to the state and the city of Flint on behalf of local citizens and organizations.[39] The petition asked the EPA to use its emergency authority under section 1431 of the Safe Drinking Water Act to require the state and Flint to immediately switch back to Detroit city water; provide alternative safe drinking water, such as bottled water, to all residents at no cost; and take other specific measures to address the problem.[40]

In late October 2015, after the national controversy erupted and NRDC and local citizens had filed their petition for emergency action, Flint switched back to the Detroit water system.

Despite the switch back to Detroit's water, lead contamination and damaged water infrastructure from the corrosive Flint River water remained. In November 2015, when it became obvious that neither the EPA nor state or local officials intended to act swiftly, NRDC and local citizens and organizations notified Flint and Michigan of our intention to file a citizen suit under the Safe Drinking Water Act against state officials, state-appointed local officials, the city administrator, and the city. On December 10, 2015, the EPA notified NRDC of its intention to "defer action" on the petition for an emergency order, on the grounds that the agency was working with state and local officials to resolve the issue.[41] In January 2016, NRDC and the

... lead exposure can shift the well-being of an entire community—creating a higher proportion of children in need of additional social and educational services, reducing the community's earning potential, and bringing higher rates of delinquency, teen pregnancy, and violence.

ACLU of Michigan filed the Safe Drinking Water Act citizen suit on behalf of their organizations and local members, as well as Concerned Pastors for Social Action and a Flint resident named Melissa Mays.[42]

The most recent water tests for which results are available (completed by Virginia Tech researchers on samples taken in March 2016) show that Flint's water still exceeds the lead action level.[43]

In late April 2016, the Michigan attorney general filed felony and misdemeanor criminal charges against a Flint water system official and two state environmental officials for allegedly misleading regulators about the contaminated water supply and otherwise violating drinking water rules.[44] The city official was charged with tampering with evidence and willfully neglecting his duty by allegedly filing false reports to the state about water quality. The two state environmental officials were charged with misconduct, tampering with evidence, conspiracy, and violating the state Safe Drinking Water Act, including allegedly altering water test results.

LEAD'S HEALTH EFFECTS CAN BE SEVERE

Lead is especially toxic to children, who are more susceptible to lead poisoning and suffer more severe impacts than adults. Scientists have found that even at low levels previously thought to be safe, lead can cause serious, irreversible damage to the developing brains and nervous systems of babies and young children.[45] Lead exposure can decrease a child's cognitive capacity, cause behavior problems, and limit the ability to concentrate, all of which, in turn, affect the ability to learn in school.[46] Children with greater lead-related brain damage are less likely to graduate from high school and more prone to delinquency, teen pregnancy, violent crime, and incarceration.[47] Scientific advisers at the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) have emphasized that some of these adverse impacts on the brain of a developing child can be irreversible and last into adulthood.[48] However, some interventions after lead exposure, such as additional educational support, may help to address the longer-term impacts.[49,50]

At the individual level, it can be difficult to discern the long-term impacts of the loss of some of these cognitive functions. Collectively, however, lead exposure can shift the well-being of an entire community—creating a higher proportion of children in need of additional social and educational services; reducing the community's earning potential; and as noted above higher rates of delinquincy, teen pregnancy, and violence. In communities with endemic lead pollution, this community-wide shift has been experienced over multiple generations.[51]

In pregnant women, lead crosses the placental barrier of the womb and can harm the fetus.[52] As noted by the CDC, "Even low-level lead exposures in developing babies have been found to affect behavior and intelligence. Lead exposure can cause miscarriages, stillbirths, and infertility (in both men and women)."[53] Even in otherwise healthy adults, lead exposure can cause adverse cardiovascular and kidney effects, cognitive dysfunction, and elevated blood pressure.[54]

Twenty-five years ago—in 1991—the EPA cautioned in the *Federal Register* that U.S. schools should remove drinking water fountains from service when the lead level exceeded 20 ppb.[55] While the EPA may no longer publicly espouse this advice, it has not established an official "imminent danger" level for lead in water.[vii] Yet in Flint, even when numerous homes' tap water far surpassed 20 ppb, and when state officials were providing bottled water to their staff in Flint, state and city officials failed to ring alarm bells for months.[56] Clearly, officials in Michigan acted irresponsibly (and in some cases criminally, according to the state attorney general) by denying the existence of a known health threat to the residents of Flint and in mocking the citizens, doctors, and scientists who sounded the alarm. The governor has apologized, and key state officials have been suspended or charged criminally. But the damage has been and continues to be done.

The majority of Flint's residents are African American, and about 40 percent live below the poverty line.[57] The median household income is nearly $25,000 (about half of the national level).[58] The recent independent Flint Water Advisory Task Force appointed by Governor Snyder (who also appointed the officials who made the disastrous decisions that led to the Flint water crisis) concluded, "Given the demographics of Flint, the implications for environmental injustice cannot be ignored or dismissed."[59]

But aren't there laws to protect against this? There are, but it's complicated.

vii In the same 1991 Federal Register notice, the EPA established the 15 ppb action level, which applies to the 90th-percentile of homes, and the 20 ppb level at which schools should remove drinking fountains from service. These dual numbers were confusing to some, but to be clear, the 15 ppb action level allows up to 10 percent of homes to be well in excess of 15 ppb without triggering an exceedance of the action level. The 20 ppb cap on allowed lead levels in school fountains was presumably intended to ensure that levels in school drinking water did not cause undue risk to children.

The Safe Drinking Water Act and Lead: A Love/Hate Story

In 1974, Congress overwhelmingly passed, and President Gerald Ford signed into law, the Safe Drinking Water Act,[60] which requires that the EPA establish standards for drinking water. States can apply to the EPA to obtain "primary enforcement responsibility," or primacy, under the Act.[61] Under this system, 49 states (Wyoming being the exception) have primacy, meaning the EPA has determined that their rules are as strict as the federal standards and that they can and will enforce the law. Once a state gets primacy, it receives substantial federal funding to carry out the law. The EPA retains the authority to enforce in primacy states if state officials fail to ensure that the law is adequately enforced, or if there is an "imminent and substantial endangerment to the health of persons."[62]

The Safe Drinking Water Act requires the EPA to set a health-based maximum contaminant level goal (MCLG) that is fully protective of health for each drinking water contaminant.[63] A "contaminant" is defined as "any physical, chemical, biological, or radiological substance or matter in water," from arsenic to xylene, that poses health risks and is regulated in our drinking water.[64,65] The agency must then establish maximum allowable levels of the contaminant, or maximum contaminant levels (MCL), as close to the MCLG as feasible, considering technological limitations and costs. In other words, the EPA sets a limit for what can be considered fully safe in drinking water, and then sets another, looser standard for tap water accounts for feasibility and costs—and which isn't necessarily safe. In the case of lead, for example, the EPA established an MCLG of zero—since there is no safe level of lead.[66] The agency then set an action level of 15 ppb for lead (discussed below), which is by no means to be viewed as "safe." *Only zero exposure to lead is safe*.

No public health or pediatric authorities believe drinking water with 14 ppb is safe and that 15 ppb is unsafe. As the EPA has said, only zero exposure to lead is safe.

If the EPA finds that it is infeasible to ascertain the level of a contaminant in drinking water, the agency is required to establish a "treatment technique" instead of an MCL. A treatment technique sets required methods of treating the water to make it safe to drink.[67] For example, the EPA has found that it is infeasible to ascertain the level of certain contaminants like *Cryptosporidium* (a disease-causing pathogen) in drinking water, so it has established a treatment technique.[68] Public water systems are responsible for satisfying an MCL or treatment technique, under the supervision of state drinking water officials and with ultimate oversight by the EPA.

In 1991, the EPA established the Lead and Copper Rule, a complex treatment technique to control lead levels in tap water.[69] This rule is intended, in part, to address the release of lead from pipes and fittings from corrosive water, so it generally requires corrosion control. Thus, under the Lead and Copper Rule, all water systems serving more than 50,000 people must either treat their water to "optimize corrosion control," or demonstrate that they don't need to do so because their water isn't corrosive and they have no lead problems. The Lead and Copper Rule generally requires water systems to add a corrosion inhibitor, such as orthophosphate, which controls corrosion and coats the inside of the pipes with a thin film that can reduce the amount of lead that leaches into the water.

The benefits of corrosion control to both private homeowners and public utilities exceed the treatment costs. Corrosion control reduces pipe breaks and leaks and makes pipes, water heaters, radiators, and plumbing components last longer. All water systems are also required to test a specified number of drinking water taps in high-risk areas (i.e., homes served by lead service lines or homes that are likely to have lead in their household plumbing or fixtures). The bigger the system, the more taps must be tested, with a maximum of 100 required in large cities.

The problem of lead service lines is enormous and widespread. While there is no comprehensive national inventory of lead service lines, experts have estimated that 6 to 10 million lead service lines are being used in the United States, serving 15 to 22 million Americans.[70] Most were installed at least 50 years ago, though some were added more recently. National restrictions on lead pipes and lead-containing plumbing fixtures were introduced in 1986. These restrictions were, however, fairly weak until a law allowing no more than 0.25 percent lead content was enacted and made effective in 2014.[71]

Under the Lead and Copper Rule, if more than 10 percent of the tested taps contain lead above the action level of 15 ppb, the water system must take measures to reduce lead levels. These measures include better corrosion control and removal of lead service lines over a specified time period. The 15 ppb level should be thought of as a way to prioritize the worst risk to human health—not as a safe level. No public health or pediatric authorities believe drinking water with 14 ppb is safe and that 15 ppb is unsafe. As the EPA has said, *only zero exposure to lead is safe*.

Lead levels vary in tap water, even within the same water system, making it fairly easy to avoid detecting lead problems.

the Safe Drinking Water Act does not allow citizens to bring an action to protect their health from an imminent and substantial endangerment—a major shortcoming.

And that's what many water systems appear to have done.[72] According to Virginia Tech researchers and investigative journalists at *The Washington Post*, *The Guardian*, and NBC News, cities from Flint to Philadelphia have allegedly been gaming the system in numerous ways to avoid detecting high levels of lead.[73,74,75,76] For example, according to *The Guardian*, Philadelphia asked water testers to remove faucet aerators (which can capture and later release lead particles) and to pre-flush their taps just before the six-hour sitting time required before the first lead test sample is collected just as the faucet is initially turned on (the so-called first-draw sample).[77] In Flint and some other cities, the EPA's rules requiring testing of at least half of the homes with lead service lines or at highest risk of having lead-tainted water have been ignored; or high lead readings have been discarded as supposed errors; or water system employees have been asked to provide water samples from their homes, irrespective of whether they meet the definition of highest-risk locations.[78]

In late February 2016, in the wake of the national outrage over the Flint crisis, the EPA issued a guidance intended to tighten testing protocols and close some of these loopholes.[viii]

ENFORCEMENT PROVISIONS OF THE SAFE DRINKING WATER ACT

States with primacy are supposed to supervise drinking water systems to ensure that they comply with EPA requirements such as the Lead and Copper Rule. As part of this requirement, primacy states must report violations and related information to the EPA every quarter.[ix] Under the Safe Drinking Water Act, if the EPA finds that a water system is in violation in a state with primacy, the agency is to notify the water system and state of the violation. If the state fails to take enforcement action within 30 days, the EPA is legally required to issue an administrative order or file an enforcement case in court against the violator.[79] But the EPA and states often ignore these important statutory safeguards for public health, sometimes arguing either that they seek to work as partners with water utilities rather than as adversaries, or that they lack the resources to enforce more.

Additionally, the EPA is authorized to immediately issue an administrative order or to bring a case in court if a contaminant "may present an imminent and substantial endangerment to the health of persons," even if no violation of the law is proven.[80] Unlike other laws (like the Resource Conservation and Recovery Act[81]), the Safe Drinking Water Act does not allow *citizens* to bring an action to protect their health from an imminent and substantial endangerment—a major shortcoming. Unfortunately, this can mean substantial delays during an ongoing health threat. In Flint, NRDC and partners had to wait for more than 3 months after asking EPA to take emergency action, and 2 months after filing a notice of intent to sue, before filing a citizen suit to address the problem.[x]

FLINT IS NOT ALONE. IN FACT, OVER *18 MILLION AMERICANS* ARE WITH THEM

While Flint's case appears extreme, make no mistake about it: Lead-contaminated tap water is a national problem. NRDC has used data from the EPA's official drinking water tracking system, the Safe Drinking Water Information System (SDWIS), to identify areas of the country impacted by violations of the Lead and Copper Rule or with lead levels above the 15 ppb action level. These maps, based on data the EPA compiles from regular state reporting to the agency, show

viii Specifically, the EPA recommended that EPA regions and states prohibit water systems from telling their Lead and Copper Rule water monitors to: (a) remove aerators from faucets before testing, since they often capture particulate lead and can be responsible for substantial lead contamination of tap water; (b) pre-flush their tap water six hours before the testing, which can reduce lead levels detected; or (c) use narrow-necked bottles that make it difficult or impossible to test water rushing out of a faucet at high velocity (as consumers often do when drawing water for a drink or for cooking), when lead levels may be high due to particulate lead having shaken loose. See Peter C. Grevatt, director, EPA Office of Ground Water and Drinking Water, "Clarification of Recommended Tap Sampling Procedures for Purposes of the Lead and Copper Rule," February 29, 2016, www.epa.gov/dwreginfo/memo-clarifying-recommended-tap-sampling-procedures-lead-and-copper-rule.

ix States are required to report violations to the EPA quarterly. 40 CFR §142.14(a). However, public water systems are sometimes required to monitor for certain contaminants, including lead, only once every six months, once a year, or sometimes less often. A violation, such as a failure to monitor or to use corrosion control, should be reported at the end of the quarter in which it occurs.

x The Safe Drinking Water Act does authorize citizens to sue public water systems that have *violated* regulations under the Act after providing 60 days' advance notice to the violator, the state, and the EPA. However, this provision requires a demonstration that the EPA's rules have been violated (which is not always apparent even when there is a clear health threat, such as when a contaminant is unregulated or the problem isn't explicitly prohibited by EPA rules). It also requires two months of delay after notification is filed, which in the case of an imminent health hazard can be extremely problematic.

widespread violations of the Lead and Copper Rule and action level exceedances across the country. Before taking a closer look at the violations that *have been* reported, however, it is important to note that not *all* violations of the Lead and Copper Rule are reflected in the database.

If Flint's extraordinary lead contamination problems are not included in the EPA's official compliance data, how many other municipalities' serious lead problems are being swept under the rug by officials responsible for protecting public health?

UNDERREPORTING OF VIOLATIONS: FLINT AS A CASE STUDY OF WIDESPREAD ISSUES

The EPA's database does not reveal any lead problems in Flint. The city's lead problems apparently were not reported in the MDEQ's formal data submissions to the EPA. This reflects the national lead landscape: deficient data reporting, poor state oversight, and an utter lack of accountability on the part of local officials as well as state and federal regulators.

Officials in primacy states, like Michigan, are legally obligated to provide detailed information on lead compliance and testing to the EPA. Flint's absence in the federal data system raises the question: If Flint's extraordinary lead contamination problems are not included in the EPA's official compliance data, how many other municipalities' serious lead problems are being swept under the rug by officials responsible for protecting public health?

In more than two decades of evaluating these data, NRDC has found that many states underreport violations, leaving the EPA database incomplete, even though all states are required to fully report these violations under federal law.[82] Indeed, the EPA's most recent review of its own compliance database candidly admits that "audits and assessments have shown that violation data [in the EPA database, as reported by states] are substantially incomplete."[83] Generally, audits and data reviews tend to show underreporting of violations recorded in the EPA database, not overreporting. Sometimes a local water system won't report a violation to the state; at other times the state will not report a violation to the EPA. In other words, if a violation is reported by a state and entered into the EPA's database, it is likely to have occurred, but even if no violation is reflected in the EPA's records, there very well may be one.

CHICAGO'S LEAD PROBLEMS: ANOTHER CASE OF UNDERREPORTING?

Elevated lead levels in drinking water can result from far simpler situations than the disaster in Flint. In Chicago, the city's laudable effort to maintain its miles and miles of water infrastructure has raised concerns about localized lead spikes and offers a clear view of a more ubiquitous lead threat across America.

Chicago is home to two of the largest water treatment plants on the planet. Available data indicate that the water leaving those plants conforms to state and federal drinking water regulations. But in some cases, the water that arrives in Chicago's taps tells a very different story. In 2013, EPA Region 5 water expert Miguel Del Toral (who has been praised for his effort to warn Flint and Michigan authorities about the emerging lead issue in Flint) warned that the Chicago's aggressive water main replacement effort was potentially exposing some households to high lead levels.[84]

When the city put in new water meters or replaced water infrastructure under the streets, it was not addressing lead service lines connected to homes. And Chicago is not unique—this is a national phenomenon. When these pipes are disturbed, they can release lead particles and damage coatings inside the pipes that would otherwise prevent corrosion to the lines. This can result in heightened lead levels for months.[85]

According to the *Chicago Tribune*, 80 percent of the homes in the city have lead service lines. This is a key reason NRDC advocates for full lead service line replacement across the country. While Chicago plans to replace 90 miles of water mains every year, it does not test the drinking water in most of the neighborhoods where work is occurring. Since 2003, the city's drinking water testing has been limited to 103 homes clustered primarily on the northwest side, far from areas with aging housing stock and infrastructure where lead issues are more likely to arise.[86] Most of the homes tested were occupied by current and former Water Department employees; the city blames the complexity of the Lead and Copper Rule for its decision to test in those locations. In this Chicago is, again, far from alone. As mentioned earlier, reports have long indicated that many big cities use testing techniques that may help make their lead levels appear low.

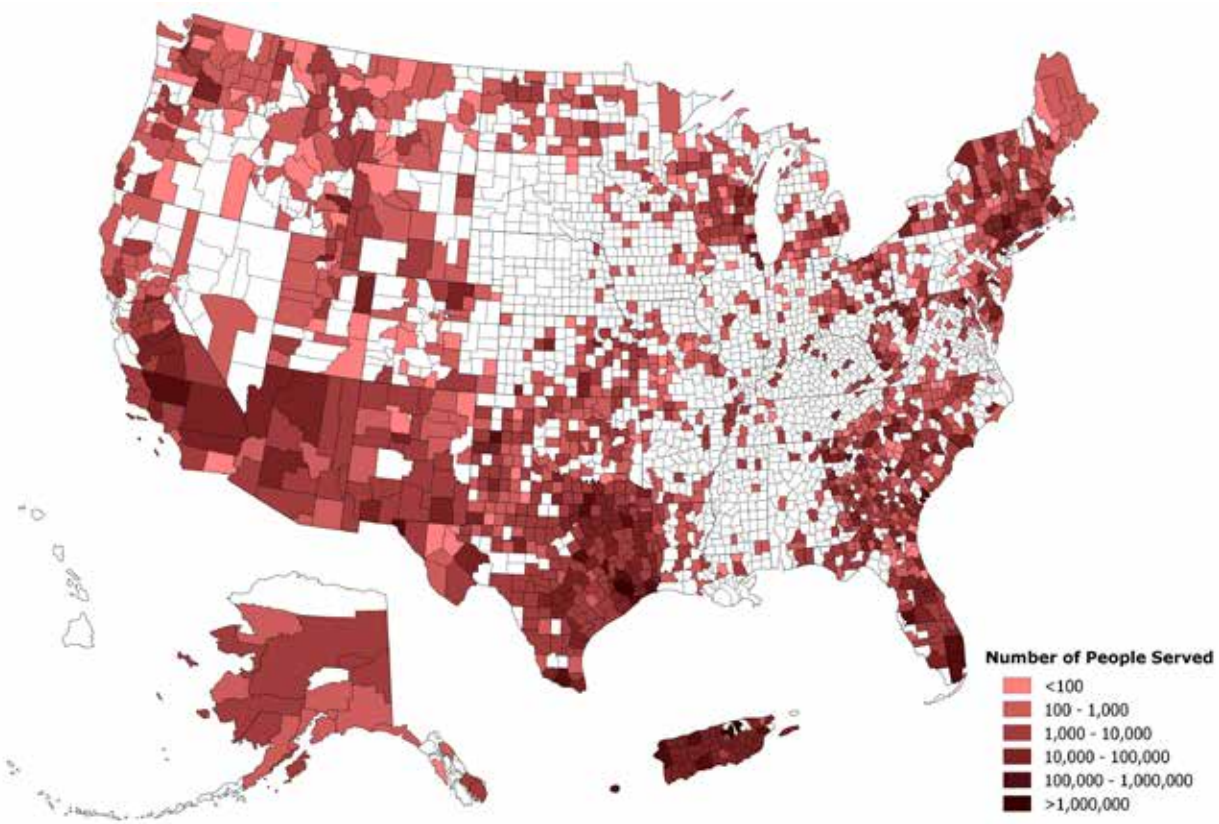
The Chicago case demonstrates that protecting public health and safety requires attention to detail. Investing in infrastructure is critical—but that investment must meet public needs and appropriate technical standards, adhere to highest risk-management protocol, and include practical follow-through to work effectively.

DESPITE UNDERREPORTING AND GAMING THE SYSTEM, THOUSANDS OF COMMUNITY WATER SYSTEMS SERVING MILLIONS HAVE REPORTED VIOLATIONS OF THE LEAD AND COPPER RULE

According to the most recent data available,[xi] 5,363 active community water systems[xii] across the United States had 8,093 violations of the Lead and Copper Rule[xiii] in calendar year 2015, including failures to properly monitor, report, or treat the water as required. These systems with reported violations in 2015 served 18,164,558 people (see figure 1).[xiv] This figure doesn't include Flint and likely many other systems whose violations were undetected, or detected but not reported to the EPA's database as legally required.

Appendix 1 includes a summary of the 100 largest systems with Lead and Copper Rule violations.

FIGURE 1: 18 MILLION PEOPLE SERVED BY COMMUNITY WATER SYSTEMS WITH REPORTED VIOLATIONS OF THE LEAD AND COPPER RULE (2015)



xi Quarter 1 of the 2016 dataset of the Safe Drinking Water Information System, providing the most up-to-date data available for calendar year 2015.

xii As mentioned in a previous note, community water systems provide drinking water year-round to the public (as opposed to non-community systems, such as those in schools or factories that serve water part of the year).

xiii Of the 8,093 violations, 3.3 percent reflect failures to treat water properly (health-based violations) and 96.7 percent reflect failures to properly monitor for lead or water-quality parameters that could result in lead contamination, or for failure to report lead sample data to the state or to consumers.

xiv Following methods used by EPA, we count violations as occurring in 2015 if they initially occurred in that year, or if they initiated in a previous year but EPA still considered them "open" (i.e. unresolved) by the end of 2015. This is how EPA generally counts violations in its reporting under the Government Performance & Results Act and its ECHO (Environmental Compliance History Online) database. Even if we limit the "open" violations to those that first occurred between January 1, 2013 and December 31, 2015, there were still 12,538,849 people served by 3,314 violating systems.

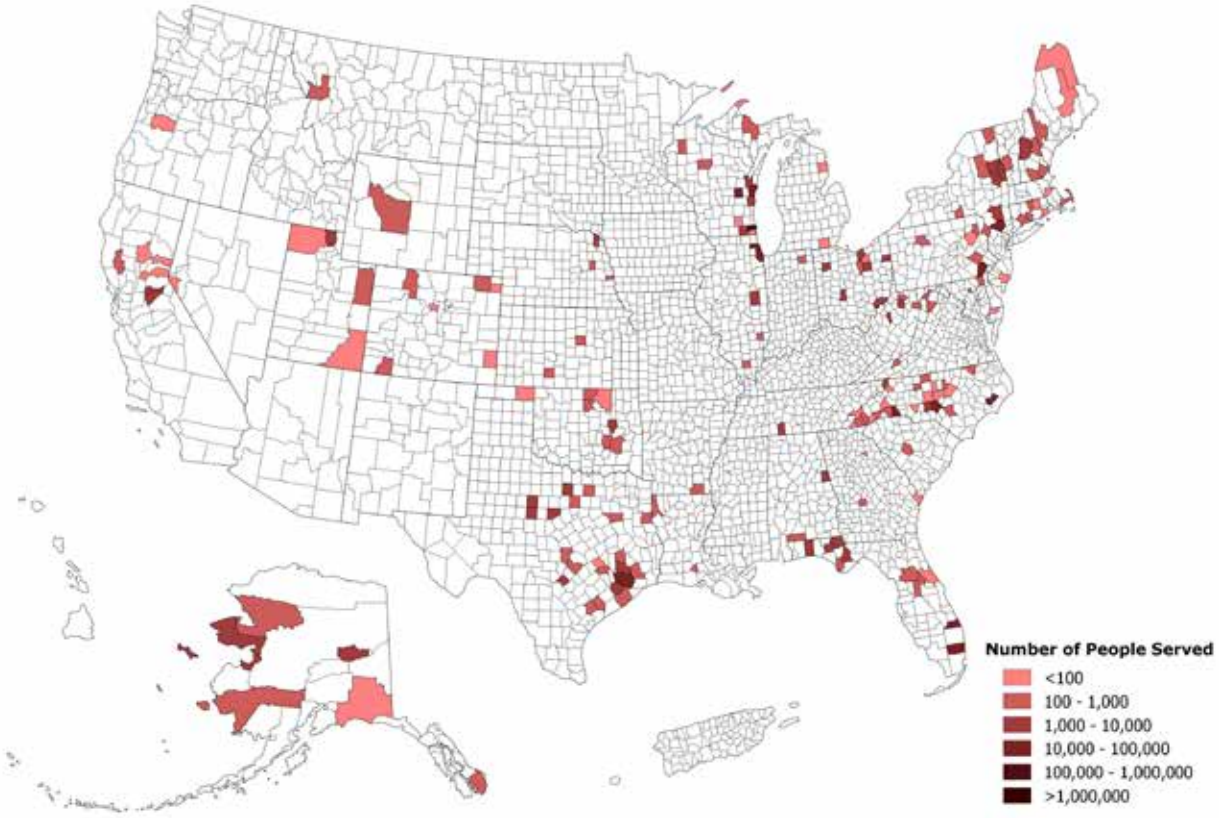
NOTWITHSTANDING UNDERREPORTING, OVER 200 COMMUNITY SYSTEMS WERE REPORTED IN VIOLATION OF THE HEALTH-BASED TREATMENT REQUIREMENTS OF THE LEAD AND COPPER RULE IN 2015

Of 2015's reported violations, 214 systems failed to meet requirements to treat water to reduce the threat to human health of lead contamination. These systems served 583,725 people (see figure 2)—again, this excludes Flint and other unreported violators.[xv] As discussed earlier, this may be just the tip of the iceberg, since many systems may have taken measures to avoid detecting or reporting problems, and many of the monitoring and reporting violations noted earlier may be masking lead contamination problems.

Enforcement of the Lead and Copper Rule at the state and federal levels is weak at best. Thus, even with underreporting, there are many community water systems in violation of the health-based treatment requirements to control for lead contamination. And since these violations have been reported by the states and recorded in the EPA's database, state and federal EPA officials are aware of the situation.

FIGURE 2: POPULATIONS SERVED BY COMMUNITY WATER SYSTEMS WITH REPORTED HEALTH-BASED VIOLATIONS OF THE LEAD AND COPPER RULE (2015)

Note that due to an epidemic of underreporting, many water systems that may be violating the health standard for lead are not represented on the map (see text).



As noted, Flint is alarmingly absent from the reported violations of the Lead and Copper Rule in 2015 (and 2014; data not shown). This is similar to past cases in which Virginia Tech researchers reported that children had elevated blood lead as a result of water lead exposure in Washington, D.C., and in Durham and Greenville, North Carolina, even as the cities publicly claimed their water was safe according to federal standards. According to the Virginia Tech team, these cases did not appear as violations because authorities gamed the system to avoid reporting results with high lead levels.[87]

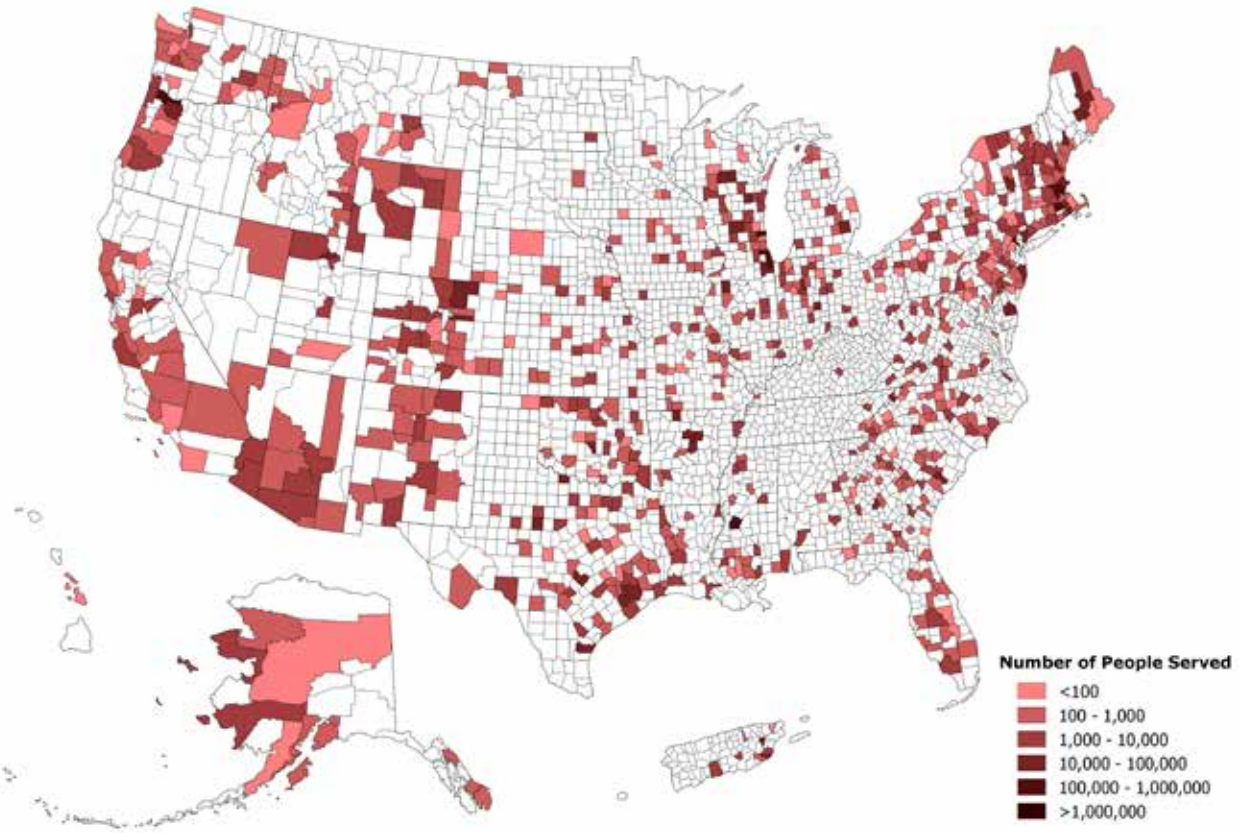
This highlights that the data reflected in these maps represent only those violations that states reported to the EPA, an understatement of the extent of the national problem.[88]

xv Following methods used by EPA, we count violations as occurring in 2015 if they initially occurred in that year, or if they initiated in a previous year but EPA still considered them "open" (i.e. unresolved) by the end of 2015. This is how EPA generally counts violations in its reporting under the Government Performance & Results Act and its ECHO (Environmental Compliance History Online) database. Even if we limit the "open" violations to those that first occurred between January 1, 2013 and December 31, 2015, there were still 260,262 people were served by 114 violating systems.

MORE THAN 1,000 COMMUNITY WATER SYSTEMS ACROSS THE UNITED STATES, SERVING MORE THAN 3.9 MILLION AMERICANS, HAD WATER THAT EXCEEDED THE EPA'S LEAD ACTION LEVEL

Figure 3 maps, by county, the populations served by community water systems that exceeded the 15 ppb action level for lead in 2013 through 2015.[xvi] In all, 1,110 community water systems exceeded the lead action level. These systems serve 3,947,770 people.[xvii,xviii]

FIGURE 3: COMMUNITY WATER SYSTEMS WITH ACTION LEVEL EXCEEDANCES (ALES)



AS FLINT ILLUSTRATES, ENFORCEMENT OF THE LEAD AND COPPER RULE IS WEAK AT BEST: INDEED, NEARLY 90 PERCENT OF SYSTEMS VIOLATING THE RULE NEVER FACED FORMAL ENFORCEMENT

As noted, 5,363 community water systems committed 8,093 violations of the Lead and Copper Rule in 2015, serving over 18 million people. Only 5.7 percent of those violations (459, to be exact) were recorded as having returned to compliance by December 31, 2015.[xix]

So, were the remaining violations subject to some kind of formal enforcement action? Generally, no.

In 2015, states and the EPA took formal enforcement action in just 908 of the 8,093 violations of the Lead and Copper Rule

xvi For action level exceedance data, we used a three-year time frame to account for the variability in monitoring and reporting requirements under the Lead and Copper Rule. Some systems are required to test and report their results only every three years (and in some instances every nine years). A three-year time frame allows for the inclusion of the test results for most systems—i.e., those that follow a six-month, annual, or three-year reporting period—and is the default data download time frame in the SDWIS.

xvii We include as lead action level exceedances all active community water systems that had lead levels recorded as exceeding the action level in 2013-2015, which includes systems with exceedances that initiated prior to January 1, 2013. If we limit the data to include only water systems with an action level exceedance that began on or after January 1,2013, 3.2 million people were served by 758 systems exceeding the lead action level.

xviii From January 1, 2013, to December 31, 2015, an additional 849 active *non*-community water systems (for example, schools or factories with their own water systems) reported action level exceedances. These systems served 248,614 people. These values were not included in the action level exceedance calculations to avoid double-counting the populations served by both community and non-community systems.

xix To give the benefit of the doubt, an additional 47 violations that were not technically recorded in the EPA's database as having returned to compliance in 2015 could be added to this total, based on other information (for example, data showing that violations had a known length of time even if they were not listed as having returned to compliance), in the EPA's SDWIS database. Even with those violations added to the total, only 6.3 of violations would be considered to have returned to compliance by the end of 2015.

committed by 5,363 systems. Under the EPA's definition, "formal enforcement action" includes entering into a compliance agreement with state authorities, issuing an administrative order with or without penalties, and bringing an enforcement action in court.[xx] States brought 820 of the 908 formal enforcement actions taken in 2015; the federal government brought just 88.[xxi] For only 3 percent of all violations, states or the EPA brought enforcement actions seeking penalties—for an anemic 252 enforcement actions out of 8,093 violations.[xxii] States brought 243 out of the 252 penalty actions. In other words, *nearly 90 percent of the violations of the Lead and Copper Rule in 2015 faced no formal enforcement action, and only 3 percent of the violations faced penalties*.[xxiii]

Most often, primacy states didn't bring formal enforcement actions, and the federal EPA isn't an effective backstop to protect public health through enforcement actions when states fail to do so. Marc Edwards, a leading researcher on lead in drinking water, recently testified in congressional hearings that the EPA's and states' failure to insist that the law be rigorously implemented has created an environment "in which 'anything goes' to hide water lead problems from the public."[89]

Flint is a wake-up call. The state and the EPA knew about Flint's lead problems for many months and did not impose an enforcement action. According to the findings of the independent Flint Water Advisory Task Force, the MDEQ and EPA Region 5 in Chicago learned of the lead problems by early 2015 at the latest.[90]

...nearly 90 percent of the violations of the Lead and Copper Rule in 2015 faced no formal enforcement action, and only 3 percent of the violations faced penalties.

As noted, the EPA was made aware of Flint's lead problem by at least February 2015, and employee Miguel Del Toral emailed the state about Flint's violation and lack of corrosion control in April 2015. State officials and the EPA privately discussed the lack of corrosion control by June 2015 at the latest. Virginia Tech researchers reported numerous samples with elevated lead levels in tap water in August and September 2015. Dr. Mona Hanna-Attisha publicized her results showing increased rates of elevated blood lead in Flint children in September 2015. The state issued its own analysis confirming Dr. Hanna-Attisha's findings on October 1, 2015.[91] The ACLU-MI asked for NRDC's help to work with Flint citizen organizations to address the drinking water problem in the summer of 2015. On October 1, 2015, NRDC, the ACLU-MI, and others jointly served a petition on behalf of a coalition of Flint citizens and local groups urging the EPA to step in and issue an emergency order in Flint due to the imminent and substantial health threat posed by the lead contamination and MDEQ's inaction.[92]

The EPA did not respond. So, in November 2015, on behalf of local citizens and groups, NRDC and ACLU-MI sent a notice of intent to sue to city and state officials for violating the Safe Drinking Water Act.[93] Again, there was no response from the EPA. In December 2015, the EPA notified NRDC that the agency had "decided to defer action on the petition" for an emergency order.[94]

While the state attorney general has filed criminal charges against two MDEQ officials and one local official, MDEQ still has not taken any enforcement action.

In January 2016, President Barack Obama spoke about the unfolding tragedy in Flint and said, "I know that if I was a parent up there, I would be beside myself that my kids' health could be at risk."[95] On January 16, 2016, the president declared a state of emergency in Flint.[96] Only then did the EPA issue a limited emergency order to the city of Flint and Michigan agencies and officials (as NRDC, ACLU-MI, and local citizens had requested months earlier).[97] The order still does not ensure compliance with the Safe Drinking Water Act, nor does it guarantee that all Flint residents will receive safe water. City and state officials also may not fully comply with the order; indeed, the state sent a letter to the EPA questioning the agency's authority to require certain actions in its emergency order.[98] NRDC, ACLU-MI, and local residents filed a citizen suit in January 2016 in an effort to ensure local citizens are fully protected from lead-contaminated water.[99]

Unfortunately, much as in Flint, the data show that in most cases neither the primacy state nor the EPA takes formal enforcement action in response to lead violations. Indeed, for many years, independent researchers and media investigations have highlighted that the EPA has allowed water utilities and primacy state agencies to hide potential lead

xx As highlighted in previous notes, we have used EPA's method of counting violations as occurring in 2015 if they initiated in that year or if they began in an earlier year but remained "open," on unresolved. If we limit the "open" violations to those initiating in the most recent 3 years (2013-2015), there were 4,449 violations by 3,314 systems, and just 281 state and federal formal enforcement actions. In other words, only 6.3 percent of violations in the more limited data set were subject to formal enforcement.

xxi If we limit the "open" (or unresolved) violations to those that occurred between January 1, 2013 and December 31, 2015, states took 275 of the 281 formal enforcement actions; the federal government took 6.

xxii If we consider only enforcement against violations that began in 2015 and/or were "open" (or unresolved) violations that occurred between January 1, 2013 and December 31, 2015, there were just 131 penalty actions (all brought by states) against 4,449 violations; still only 3 percent of violations faced penalties.

xxiii Actions against health-based violations of the Lead and Copper Rule were not much better. Formal enforcement was taken against just 47 of the 267 (17.6 percent) health-based violations in 2015, using the the conventional EPA approach of including "open" (unresolved) violations. If we limit the data on "open" health-based violations to those that began between January 1, 2013 and December 31, 2015, there were just 9 formal enforcement actions taken against 136 health-based violations, or 6.6 percent facing formal enforcement.

Low-income communities and communities of color throughout the United States often bear the burden of environmental contamination and the resulting health problems.

contamination through monitoring techniques and other means to avoid detecting or reporting the problem.[100,101]

States and the EPA sometimes argue that "informal" enforcement action such as a warning letter is enough to bring water systems into compliance. They may argue that a "partnership" with water systems better encourages cooperation and is preferable to disagreeable enforcement action that only breeds antagonism. However, no data support this assertion. Rather, informal actions create a virtually risk-free atmosphere for water systems that violate the law, and innocent children are left to suffer the consequences.

There is a reason police officers issue tickets with fines to speeding drivers: to signal to everyone that compliance with the law is expected and that violations will be punished. For drinking water suppliers who violate the law and gamble with the health of millions of people, the opposite message is clear. While there may be a role for enforcement discretion to avoid excessively penalizing systems that cannot afford to pay substantial penalties, state and federal authorities' failure to bring any formal enforcement whatsoever—even non-penalty orders—in nine out of ten cases sends the wrong signal.

LOW-INCOME HOUSEHOLDS AND COMMUNITIES OF COLOR ACROSS THE COUNTRY ARE AT THE FRONT LINES OF OUR NATIONAL WATER CRISIS

Flint's predominantly African American population has a high percentage of residents living at or below the poverty line or working but struggling to make ends meet. According to the independent Flint Water Advisory Task Force, state officials were more than just "callous and dismissive" of these citizens:

> The facts of the Flint water crisis lead us to the inescapable conclusion that this is a case of environmental injustice. Flint residents, who are majority Black or African-American and among the most impoverished of any metropolitan area in the United States, did not enjoy the same degree of protection from environmental and health hazards as that provided to other communities. Moreover, by virtue of their being subject to emergency management, Flint residents were not

> ***"I know that if I was a parent up there, I would be beside myself that my kids' health could be at risk."***
>
> *-President Barack Obama*
> *January 2016*

provided equal access to, and meaningful involvement in, the government decision-making process.[102]

Unfortunately, unresponsive government officials who ridicule and disparage community members and experts are not limited to Flint. Low-income communities and communities of color throughout the United States often bear the burden of environmental contamination and the resulting health problems.[103] Flint's brew of contaminated water, governmental indifference and complicity, race, and class is not an anomaly. Researchers have found that "unequal access to infrastructure drives unequal access to safe drinking water," and in particular that lower-income communities bear a disproportionate "persistent drinking water burden."[104] NRDC is now analyzing spatial patterns of drinking water violations, especially lead and other contamination problems, to evaluate the extent to which such issues can be documented nationally. Our findings will be presented in an upcoming report.

MAJOR INVESTMENTS IN WATER INFRASTRUCTURE WILL PROTECT HEALTH—AND CREATE JOBS

Flint's outdated system simply cannot deliver safe drinking water. Unfortunately, it is by no means the only city with an aging and crumbling water infrastructure. In many other communities across the country, there are millions of lead service lines from which water is leaching toxic lead and contaminating tap water.

Lack of investment in water infrastructure is a serious national problem. For instance:

- **The American Society of Civil Engineers has given the U.S. water infrastructure a D**, or worse, every four years since at least 2001.[105,106] The engineers note that pipes and mains are often nearing the end of their useful life, causing frequent pipe failures and other problems.
- **There are 240,000 water main breaks per year** due to crumbling and poorly maintained underground drinking water pipes.[107]
- **We routinely lose an average of 14 to 18 percent of our drinking water** due to leaking underground pipes.[108]
- **Water industry experts recently estimated that more than six million lead service lines are still in use in the United States.**[109] The nation's largest drinking water utility trade association, the American Water Works Association, has recommended that all lead service lines be replaced to reduce the threat of lead contamination.[110] The good news: new, lower-cost techniques for replacing service lines in Lansing, Michigan, and elsewhere demonstrate that innovative approaches are bringing costs down.[111]
- **The American Water Works Association estimates a cost of $1 trillion to upgrade, repair, and maintain our drinking water infrastructure** to serve the population as it grows over the next 25 years.[112] In contrast, since 2010, Congress has appropriated just over $2 billion per year for the safe drinking water and clean water infrastructure funds, funding a tiny fraction of the work needed.[113] The total costs must be shared by states and localities, as they have been for generations, but the current federal investment is not making a dent in the problem.

Investing in our water infrastructure not only buys health protection but also helps rebuild the nation's economic base and creates jobs. Economic growth and social stability require a reliable water supply. Industry, commercial development, and robust residential growth all need a safe and dependable source of water.[114] Moreover, major investment in water infrastructure will create hundreds of thousands or even millions of well-paid jobs. A recent study found that an investment of $188.4 billion in water infrastructure (an EPA estimate of wastewater-related infrastructure needs) spread equally over the next five years would generate $265.6 billion in economic activity and create close to 1.9 million jobs.[115] The study found that such infrastructure investments "create over 16 percent more jobs dollar-for-dollar than a payroll tax holiday, nearly 40 percent more jobs than an across-the-board tax cut, and more than five times as many jobs as temporary business tax cuts."[116]

Recommendations

Several major changes are needed at the national level to protect the health of millions of Americans:

1. **Fix Flint.** Flint's water infrastructure must be immediately repaired and replaced. This includes fully replacing lead service lines and damaged water mains, and modernizing water treatment. The city and state must ensure that safe, reliable water (i.e., bottled water) is supplied in the meantime. As recommended by the Flint Water Advisory Task Force, the Flint community will require a registry so that those exposed to lead are tracked to ensure that they get needed support, and extensive health monitoring and educational and nutritional support should be provided to help those who have been poisoned for years to come.
2. **Fix Our National Water Infrastructure, Paying Special Attention to the Needs of Disproportionately Affected Communities.** We must:
   a. Fully replace the six million-plus lead service lines, including those that have been only partially replaced.
   b. Test drinking water in schools and day care centers for lead. Children are especially susceptible to lead poisoning, and lead-contaminated drinking fountains that serve kids should be immediately repaired or replaced.
   c. Replace or repair decaying or outdated parts of the distribution system, such as leaking and crumbling water mains. These old pipes are prone to water main breaks and serious leakage, wasting water and money and allowing pathogens to penetrate the system or multiply in areas of decay, which poses health threats.[117]
   d. Improve drinking water treatment. NRDC studies have found that most U.S. drinking water treatment plants still use 100-year-old treatment technologies such as sand filtration and chlorination. These technologies work fairly well to remove some basic contaminants, such as mud and some bacteria, but cannot effectively remove many of the modern contaminants such as pesticides, industrial chemicals, pharmaceuticals, and other chemicals that are widespread in water.[118] We need to invest in modernizing our treatment plants, as has been done in places like Cincinnati.[119]

   Current congressional funding of $2.37 billion per year for water infrastructure falls far short of the enormous need.[120] This investment must be substantially increased, to at least the approximately $8 billion per year stipulated by the American Recovery and Reinvestment Act of 2009.[121] The EPA and state agencies managing these investments should better leverage and prioritize funding (including grants) for water infrastructure improvements in low-income communities and communities of color.
3. **Fix the Lead and Copper Rule.** Lead-contaminated drinking water remains a major problem around the country. The EPA's Lead and Copper Rule—and the way states and the EPA implement and enforce it—needs a major overhaul. The Lead and Copper Rule, at a minimum, should: (1) require full replacement of all lead service lines; (2) improve monitoring and prohibit gaming the system to avoid detecting or reporting lead contamination problems; and (3) require clear, ongoing, and culturally appropriate public education and notification of lead problems (e.g., issuing notifications in plain language, using languages reflective of the community, and using multiple types of media).
4. **Strengthen All Drinking Water Enforcement, and Let Citizens Act Immediately in Cases of Imminent and Substantial Endangerment to Health.** Enforcement has been decimated by poor funding, lack of management support at the state and federal levels, and fear of political repercussions by the EPA.[xxiv] We need to renew the enforcement culture at the EPA and primacy agencies to reinforce the importance of ensuring the protection of public health. Enforcement penalties in the Safe Drinking Water Act should also be strengthened. In addition, citizens whose water may present an imminent and substantial endangerment to health should be authorized under the law to immediately sue for relief.
5. **Address Environmental Injustices.** Intentions aside, an environmental injustice is an environmental injustice. The EPA and state environmental officials should take such cases seriously and prioritize them for resources and enforcement, including permits, regulatory protections, and infrastructure funding. Specifically, the EPA and environmental officials should adopt a community-participatory model, allowing community members who are at highest risk from tap water contamination to participate in developing solutions to drinking water infrastructure challenges.

xxiv The EPA's fear of political blow back is perhaps partially due to the haranguing of the agency by conservative members of Congress over the past several years for supposed "overreach" or "overly aggressive" enforcement.

APPENDIX 1

100 LARGEST COMMUNITY WATER SYSTEMS WITH LEAD AND COPPER RULE (LCR) VIOLATIONS IN 2015[xxv]

Note that NRDC has obtained these data directly from EPA's Safe Drinking Water Information System, which the agency compiles from data submitted by state regulators in accordance with EPA rules. NRDC has not independently verified these data.

RANKED BY POPULATION, LARGEST FIRST

SYSTEM NAME	SYSTEM ID NUMBER	SYSTEM STATE	SYSTEM COUNTY(IES) SERVED	POPULATION SERVED	TOTAL NUMBER OF REPORTED LCR VIOLATIONS	TOTAL NUMBER OF REPORTED WATER TREATMENT LCR VIOLATIONS
CITY OF HOUSTON	TX1010013	TX	Harris	2,233,310	1	0
METROPOLITANO	PR0002591	PR	Bayamon, San Juan, Toa Alta	1,064,730	4	0
EL PASO WATER UTILITIES PUBLIC SERVICE B	TX0710002	TX	El Paso	631,442	1	0
HOWARD COUNTY D.P.W. DISTRIBUTION	MD0130002	MD	Howard	247,000	1	0
HIALEAH, CITY OF	FL4130604	FL	Miami-Dade	229,900	1	0
AMARILLO MUNICIPAL WATER SYSTEM	TX1880001	TX	Potter	195,250	2	0
NORTH MIAMI BEACH	FL4131618	FL	Miami-Dade	170,000	1	0
PONCE URBANO	PR0003824	PR	Penuelas, Ponce	153,092	2	0
CITY OF KILLEEN	TX0140006	TX	Bell	137,147	1	0
NORTH ALAMO WSC	TX1080029	TX	Hidalgo	127,824	1	0
CITY OF BEAUMONT WATER UTILITY DEPT	TX1230001	TX	Jefferson	118,228	1	0
CITY OF DENTON	TX0610002	TX	Denton	115,233	1	0
CITY OF PASADENA	TX1010293	TX	Harris	110,058	1	0
CITY OF TYLER	TX2120004	TX	Smith	109,242	1	0
RACINE WATERWORKS	WI2520062	WI	Racine	105,100	1	1
ARECIBO URBANO	PR0002652	PR	Arecibo	92,942	3	0
SEACOAST UTILITIES AUTHORITY	FL4501124	FL	Palm Beach	90,612	1	0
AQUA OHIO - MASSILLON PWS	OH7604512	OH	Stark	90,000	1	0
CITY OF BRYAN	TX0210001	TX	Brazos	80,877	1	0
CITY OF EDINBURG	TX1080004	TX	Hidalgo	77,100	1	0
CLEAR LAKE CITY WATER AUTHORITY	TX1010056	TX	Harris	77,046	1	0
RIO BLANCO,VIEQUES,CULEDRA	PR0005386	PR	Las Piedras, Naguabo, Vieques	76,455	5	0
SOUTHFIELD	MI0006160	MI	Oakland	71,739	1	0
GENESEE COUNTY WATER SYSTEM	MI0002615	MI	Genesee	71,500	1	0
FLORENCE CITY OF (2110001)	SC2110001	SC	Florence	71,188	1	0
CITY OF PHARR	TX1080009	TX	Hidalgo	70,400	1	0

xxv Based upon data for violations that occurred between January 1, 2015 and December 31, 2015 or were "open" (but unresolved) violations that occurred between January 1, 2013 and December 31, 2015; from the 2016 Quarter 1 data set of the EPA Safe Drinking Water Information System (SDWIS).

SYSTEM NAME	SYSTEM ID NUMBER	SYSTEM STATE	SYSTEM COUNTY(IES) SERVED	POPULATION SERVED	TOTAL NUMBER OF REPORTED LCR VIOLATIONS	TOTAL NUMBER OF REPORTED WATER TREATMENT LCR VIOLATIONS
CITY OF TEMPLE	TX0I40005	TX	Bell	69,I80	2	0
TOWN OF FLOWER MOUND	TX06I0023	TX	Denton	68,609	I	0
TAMARAC (WEST), CITY OF	FL406I429	FL	Broward	63,270	I	0
DANBURY WATER DEPARTMENT	CT0340011	CT	Fairfield	62,055	I	0
LANCASTER COUNTY W&SD (2920001)	SC2920001	SC	Lancaster	58,594	I	0
CITY OF GALVESTON	TX0840003	TX	Galveston	56,200	I	0
CHICOPEE WATER DEPT (MWRA)	MAI06I000	MA	Hampden	55,I44	I	0
BERWYN	IL03I02I0	IL	Cook	55,000	2	I
EL YUNQUE	PR0005296	PR	Naguabo, Rio Grande	54,350	3	0
TEXAS A&M UNIVERSITY MAIN CAMPUS	TX02I0017	TX	Brazos	54,I00	I	0
CITY OF SAN MARCOS	TXI050001	TX	Hays	53,540	I	0
LOWER VALLEY WATER DISTRICT	TX07I0I54	TX	El Paso	53,298	I	0
LAKEWOOD CITY PWS	OHI80I003	OH	Cuyahoga	52,I00	I	0
FAJARDO CEIBA	PR0005306	PR	Fajardo	50,837	I	0
MANATI EAST	PR0003262	PR	Manati	47,5I9	I	0
CITY OF BURLESON	TXI260002	TX	Johnson	45,594	I	0
REGIONAL VILLALBA TOA VACA	PR0004664	PR	Villalba	45,080	2	0
PATILLAS URBANO	PR0004835	PR	Patillas	44,I66	I	0
GUAYAMA URBANO	PR0004745	PR	Arroyo, Guayama	43,947	2	0
CITY OF HALTOM CITY	TX2200014	TX	Tarrant	43,475	I	0
CITY OF KELLER	TX2200096	TX	Tarrant	42,500	I	0
CAGUAS NORTE	PR0005086	PR	Caguas	4I,97I	I	0
CITY OF ROCKWALL	TXI990001	TX	Rockwall	4I,236	I	0
JUNCOS - CEIBA SUR	PR0005I66	PR	Juncos	39,460	I	0
HOMESTEAD, CITY OF	FL4I30645	FL	Miami-Dade	39,000	I	0
CITY OF WYLIE	TX0430011	TX	Collin	38,994	I	0
UNIVERSITY OF NEW MEXICO	NM3575501	NM	Bernalillo	35,000	I	0
CITY OF NACOGDOCHES	TXI740003	TX	Nacogdoches	34,037	I	0
CITY OF DENISON	TX09I0003	TX	Grayson	32,340	2	0
CITY OF WESLACO	TXI0800II	TX	Hidalgo	32,092	I	0
LAS PIEDRAS HUMACAO	PR0005376	PR	Humacao, Naguabo	3I,428	3	0
CITY OF SALISBURY	MD0220004	MD	Wicomico	30,343	I	0
TEXAS STATE UNIVERSITY - SAN MARCOS	TXI050003	TX	Hays	30,000	I	0
NORTHAMPTON WATER DEPT	MAI2I4000	MA	Hampshire	29,342	I	0
DORADO URBANO	PR0005607	PR	Dorado	28,2I8	4	0
FORT BLISS MAIN POST AREA	TX07I0020	TX	El Paso	28,053	I	0
INMAN CAMPOBELLO W/D (4220002)	SC4220002	SC	Spartanburg	27,383	I	0
CAGUAS SUR	PR0005066	PR	Caguas	25,725	I	0
MONTGOMERY COUNTY MUD 47	TXI700458	TX	Montgomery	25,600	I	0

SYSTEM NAME	SYSTEM ID NUMBER	SYSTEM STATE	SYSTEM COUNTY(IES) SERVED	POPULATION SERVED	TOTAL NUMBER OF REPORTED LCR VIOLATIONS	TOTAL NUMBER OF REPORTED WATER TREATMENT LCR VIOLATIONS
MOROVIS URBANO	PR0002762	PR	Morovis	25,506	1	0
JUNCTION CITY, CITY OF	KS2006108	KS	Geary	24,665	1	0
CITY OF COLLEYVILLE	TX2200043	TX	Tarrant	23,500	1	0
SAN LORENZO URBANO	PR0005106	PR	San Lorenzo	23,276	1	0
SPRINGS HILL WSC	TX0940022	TX	Guadalupe	23,000	1	0
CITY OF BELLAIRE	TX1010004	TX	Harris	22,473	1	0
CABO ROJO	PR0003373	PR	Cabo Rojo	21,987	1	0
WILMINGTON WATER DEPT	MA3342000	MA	Middlesex	21,906	1	0
PENUELAS	PR0004324	PR	Penuelas	21,772	1	0
OAK ISLAND, TOWN OF	NC0410020	NC	Brunswick	20,523	1	0
CITY OF SAGINAW	TX2200023	TX	Tarrant	20,500	1	0
GAFFNEY BPW (1110001)	SC1110001	SC	Cherokee	20,304	1	0
COALINGA-CITY	CA1010004	CA	Fresno	19,362	1	0
CITY OF STEPHENVILLE	TX0720002	TX	Erath	19,320	1	0
CITY OF PORTLAND	TX2050005	TX	San Patricio	19,186	1	0
CHINO, CITY OF	CA3610012	CA	San Bernardino	18,907	1	0
CITY OF ROMA	TX2140007	TX	Starr	18,903	1	0
UTUADO URBANO	PR0002702	PR	Utuado	18,787	2	0
LOGAN COUNTY PSD - NORTHERN REGIONAL	WV3302364	WV	Logan	18,691	1	0
CITY OF ANGLETON	TX0200002	TX	Brazoria	18,120	1	0
CITY OF MURPHY	TX0430042	TX	Collin	18,020	1	0
NEGROS	PR0005537	PR	Corozal	17,988	1	0
CAYEY URBANO	PR0004635	PR	Cayey	17,814	2	0
WELLS BRANCH MUD 1	TX2270227	TX	Travis	17,704	1	0
CITY OF TERRELL	TX1290006	TX	Kaufman	17,665	1	0
LARES ESPINO	PR0003872	PR	Lares	17,554	2	0
MONTGOMERY COUNTY MUD 46	TX1700348	TX	Montgomery	17,463	2	0
CITY OF HEWITT	TX1550031	TX	McLennan	17,310	1	0
AIBONITO LA PLATA	PR0004545	PR	Aibonito	17,278	2	0
PIONEER RURAL WATER DIST (3720001)	SC3720001	SC	Oconee	16,236	1	0
HARRIS COUNTY MUD 53	TX1010720	TX	Harris	16,164	1	0
SARDIS LONE ELM WSC	TX0700034	TX	Ellis	15,900	1	0
PORTER SUD	TX1700068	TX	Montgomery	15,892	1	0
MILITARY HWY WSC PROGRESO	TX1080234	TX	Hidalgo	15,765	1	0
CRYSTAL CLEAR WSC	TX0940015	TX	Guadalupe	15,690	1	0

APPENDIX 2

100 COMMUNITY WATER SYSTEMS WITH THE MOST LEAD AND COPPER RULE (LCR) VIOLATIONS IN 2015[xxvi]

Note that NRDC has obtained these data directly from EPA's Safe Drinking Water Information System, which the agency compiles from data submitted by state regulators in accordance with EPA rules. NRDC has not independently verified these data.

ORGANIZED BY TOTAL NUMBER OF LCR VIOLATIONS, MOST FIRST

SYSTEM NAME	SYSTEM ID NUMBER	SYSTEM STATE	SYSTEM COUNTY(IES) SERVED	POPULATION SERVED	TOTAL NUMBER OF REPORTED LCR VIOLATIONS	TOTAL NUMBER OF REPORTED WATER TREATMENT LCR VIOLATIONS
BEAVER CO RWD #2 (GATE)	OK2000405	OK	Beaver	87	8	1
POTOSI WSC	TX2210008	TX	Taylor	5,595	6	3
GENOA CITY WATERWORKS	WI2650058	WI	Walworth	2,766	6	4
LAKE VALLEY WATER	TX2470020	TX	Wilson	408	6	0
TRI COUNTY POINT WATER SYSTEM 3	TX1200028	TX	Jackson	297	6	0
VALLENAR VIEW MOBILE HOME PARK	AK2120012	AK	Ketchikan Gateway	225	6	0
TYONEK WATER SYSTEM	AK2240472	AK	Kenai Peninsula	199	6	0
GREEN HILLS SUBDIVISION	TX0340019	TX	Cass	108	6	0
PEAK PROPERTIES	TX1650043	TX	Midland	99	6	0
PORT ALEXANDER PWS	AK2130156	AK	Sitka	95	6	0
STOCKTON WATER SYSTEM	PA2400148	PA	Luzerne	85	6	0
CEDAR LAKE CONDO	NC0319128	NC	Chatham	84	6	3
CIRCLE H MHP	NC0363124	NC	Moore	75	6	0
OAK HILL ACRES MOBILE HOME SUBDIVISION	TX0150156	TX	Bexar	75	6	0
PLAZA MOBILE HOME PARK	TX0150552	TX	Bexar	66	6	0
FOUR POST COMMUNITY WATER SYSTEM	TX1290050	TX	Kaufman	66	6	0
WILLOWBROOK SUBDIVISION	TX2370049	TX	Waller	66	6	0
LEROYS MOBILE HOME PARK	TX0190074	TX	Bowie	60	6	0
PLATINUM CITY WATER SYSTEM	AK2271059	AK	Bethel	51	6	0
WALNUT BEND WATER SYSTEM	TX0030037	TX	Angelina	51	6	0
PINE KNOB SUBDIVISION	TX1700652	TX	Montgomery	39	6	1
IWANDA MOBILE HOME PARK	TX1810061	TX	Orange	38	6	0
KEY ROAD SUBDIVISION WATER SYSTEM	TX2350055	TX	Victoria	37	6	0
LAKESIDE WATER COMPANY	TX0030104	TX	Angelina	16	6	0
RIO BLANCO,VIEQUES,CULEDRA	PR0005386	PR	Las Piedras, Naguabo, Vieques	76,455	5	0
CERRILLOS	PR0004634	PR	Ponce	8,203	5	0

xxvi Based upon data for violations that occurred between January 1, 2015 and December 31, 2015 or were "open" (but unresolved) violations that occurred between January 1, 2013 and December 31, 2015; from the 2016 Quarter 1 data set of the EPA Safe Drinking Water Information System (SDWIS).

SYSTEM NAME	SYSTEM ID NUMBER	SYSTEM STATE	SYSTEM COUNTY(IES) SERVED	POPULATION SERVED	TOTAL NUMBER OF REPORTED LCR VIOLATIONS	TOTAL NUMBER OF REPORTED WATER TREATMENT LCR VIOLATIONS
EASTERN WYOMING PSD STEPHENSON WTP	WV3305521	WV	Wyoming	3,465	5	0
CITY OF ROTAN	TX0760002	TX	Fisher	1,508	5	0
MORRIS	OK3005610	OK	Okmulgee	1,440	5	2
LA PASADA MDWCA	NM3517725	NM	San Miguel	177	5	0
ROLLING HILLS WATER SUPPLY	TX1550139	TX	McLennan	168	5	0
LONE GROVE MHC	OK2001039	OK	Carter	150	5	0
COAL MOUNTAIN WATER	WV3305527	WV	Wyoming	118	5	0
AERO VALLEY WATER SERVICE	TX0610243	TX	Denton	114	5	0
WHISPERING OAKS WATER COOP	TX1160081	TX	Hunt	105	5	0
ROUGH CANYON CONDOS	TX2330047	TX	Val Verde	97	5	0
HARRISBURG WSC	TX1210013	TX	Jasper	96	5	0
PIERPOINT WATER	WV3305536	WV	Wyoming	88	5	0
SELLERS ESTATES MOBILE HOME COMM	TX1011459	TX	Harris	85	5	0
PINNACLE WATER ASSOCIATION	WV3302828	WV	Mercer	85	5	0
NORTHVIEW MOBILE HOME PARK	TX1880015	TX	Potter	75	5	0
HIAWATHA WATER	WV3302814	WV	Mercer	75	5	0
RAINBOW VALLEY	OK2006306	OK	Pottawatomie	70	5	0
OLD ALTON WATER	TX0610268	TX	Denton	69	5	0
GREEN LAKE ESTATES WATER SUPPLY	TX1470034	TX	Limestone	66	5	0
JUNIPER HILLS RANCH	NM3574826	NM	Santa Fe	65	5	0
CIMARRON CITY	OK2004253	OK	Logan	65	5	0
HOLLISTER	OK2007102	OK	Tillman	60	5	0
HIDDEN TREE RANCH	TX1520009	TX	Lubbock	60	5	0
CLARA HILLS WATER SYSTEM	TX0260022	TX	Burleson	57	5	1
HAVENSHIRE WATER SYSTEM	TX1700588	TX	Montgomery	57	5	0
TURNER WATER SERVICE	TX0790190	TX	Fort Bend	54	5	0
MAR LYNN SUBDIVISION	TX1840103	TX	Parker	42	5	1
LEE LIMAS MOBILE HOME PARK	TX0710158	TX	El Paso	39	5	0
GREENVILLA MOBILE HOME PARK	TX0840067	TX	Galveston	39	5	0
SHELBY WATER	TX2100038	TX	Shelby	38	5	0
CABAZOS HOMES	TX1520269	TX	Lubbock	34	5	0
HICKORY HOLLOW MHP	OK3001947	OK	Creek	26	5	0
ELM GROVE MOBILE HOME PARK	TX1520156	TX	Lubbock	17	5	0
LUQUILLO URBANO	PR0005316	PR	Luquillo	0*	5	0
METROPOLITANO	PR0002591	PR	Bayamon, San Juan, Toa Alta	1,064,730	4	0
DORADO URBANO	PR0005607	PR	Dorado	28,218	4	0
MAUNABO URBANO	PR0004815	PR	Maunabo	12,307	4	0
LAGO GUAJATACA	PR0003772	PR	Isabela, San Sebastian	10,629	4	0

* According to the 2015 Quarter 3 dataset of the Safe Drinking Water Information System, this system served 12,051 people.

SYSTEM NAME	SYSTEM ID NUMBER	SYSTEM STATE	SYSTEM COUNTY(IES) SERVED	POPULATION SERVED	TOTAL NUMBER OF REPORTED LCR VIOLATIONS	TOTAL NUMBER OF REPORTED WATER TREATMENT LCR VIOLATIONS
YABUCOA URBANO	PR0005196	PR	Yabucoa	9,868	4	0
JACAGUAS	PR0004534	PR	Juana Diaz	5,156	4	0
DUEY	PR0004234	PR	Maricao, Yauco	3,388	4	0
THREE RIVERS FIRE DISTRICT	MA1227003	MA	Hampden	3,258	4	0
CITY OF REFUGIO	TX1960001	TX	Refugio	2,890	4	0
SABANA GRANDE	PR0003192	PR	Utuado	2,707	4	0
CITY OF RANGER	TX0670004	TX	Eastland	2,565	4	2
GUARAGUAO	PR0004114	PR	Ponce	1,680	4	0
RAMON VALENTIN	PR0003399	PR	Moca	1,123	4	0
WOODWARD CO RWD #2	OK2007710	OK	Woodward	920	4	0
SPRING FOREST SUBDIVISION	TX1700033	TX	Montgomery	756	4	0
SHAWNEE CO RWD 2C	KS2017713	KS	Shawnee	700	4	0
LEON, CITY OF	KS2001515	KS	Butler	697	4	0
MOROVIS	PR0005486	PR	RIO GRANDE	614	4	0
WASHINGTON CO RWD #7	OK3007415	OK	Washington	340	4	0
PARKER	1.05E+08	EPA Region 10	-	300	4	0
R&K WEIMAN MHP	TX1012019	TX	Harris	279	4	0
ROCK CREEK WSC	TX1820080	TX	Palo Pinto	279	4	0
WALNUT RIDGE ESTATES WATER SYSTEM	TX0030006	TX	Angelina	178	4	0
HILLSIDE WATER WORKS	TX0710050	TX	El Paso	156	4	0
SAVANNAH PLANTATION SUBDIVISION	TX0200599	TX	Brazoria	129	4	0
TIMBER CREEK ADDITION	TX0490030	TX	Cooke	123	4	0
CENTERLINE WSC	TX0260012	TX	Burleson	105	4	0
CASSIE WATER SYSTEM	TX0270047	TX	Burnet	102	4	3
OZARK WATER INC	OK3001125	OK	Cherokee	99	4	0
HARBOUR LIGHT ESTATES COMMUNITY	MD0220212	MD	Wicomico	95	4	1
HERITAGE OAKS ADDITION	TX2200090	TX	Tarrant	93	4	0
HILLTOP MOBILE HOME PARK	TX2200107	TX	Tarrant	90	4	0
TELEMARK VILLAGE	VT0005571	VT	Rutland	82	4	2
FORT JACKSON MOBILE ESTATES	TX1520064	TX	Lubbock	61	4	0
SUNSET VALLEY ESTATES LLC	KS2005101	KS	Ellis	60	4	0
CHAPLINES MOBILE HOME PARK	TX0200181	TX	Brazoria	60	4	0
WILDWOOD ESTATES SUBDIVISION WATER SYSTE	TX2040052	TX	San Jacinto	55	4	0
LOS BOTINES CAFE	TX2400043	TX	Webb	54	4	0
MARY JACKSON TP	OK2001036	OK	Carter	50	4	0
CITRUS TRAILER PARK	TX0310017	TX	Cameron	45	4	0

APPENDIX 3

100 LARGEST COMMUNITY WATER SYSTEMS WITH LEAD ACTION LEVEL EXCEEDANCES (ALES) IN 2013–2015[xxvii]

Note that the EPA action level is 15 ppb in the 90th-percentile sample; an ALE is not itself considered a violation. Also note that NRDC has obtained these data directly from EPA's Safe Drinking Water Information System, which the agency compiles from data submitted by state regulators in accordance with EPA rules. NRDC has not independently verified these data.

RANKED BY POPULATION, LARGEST FIRST

SYSTEM NAME	SYSTEM ID NUMBER	SYSTEM STATE	SYSTEM COUNTY(IES) SERVED	POPULATION SERVED	NUMBER OF ACTION LEVEL EXCEEDANCES	AVERAGE ALE LEVEL (PPB)	MINIMUM ALE LEVEL (PPB)	MAXIMUM ALE LEVEL (PPB)	START DATE OF ALE SAMPLE COLLECTION	END DATE OF ALE SAMPLE COLLECTION
PORTLAND WATER BUREAU	OR4100657	OR	Multnomah	585,000	1	15.9	15.9	15.9	7/1/2013	12/31/2013
PASSAIC VALLEY WATER COMMISSION	NJ1605002	NJ	Passaic	314,900	1	17.0	17.0	17.0	1/1/2015	12/31/2015
PROVIDENCE-CITY OF	RI1592024	RI	Providence	295,700	2	23.0	16.0	30.0	7/1/2014	12/31/2014
TUALATIN VALLEY WATER DISTRICT	OR4100665	OR	Washington	206,600	1	15.9	15.9	15.9	7/1/2013	12/31/2013
CITY OF JACKSON	MS0250008	MS	Hinds	192,547	1	28.6	28.6	28.6	1/1/2013	12/31/2015
RACINE WATERWORKS	WI2520062	WI	Racine	105,100	1	19.0	19.0	19.0	6/1/2014	9/30/2014
NEW BEDFORD DEPT. OF PUB. INFRASTRUCTURE	MA4201000	MA	Bristol	95,072	1	31.0	31.0	31.0	1/1/2015	6/30/2015
GRESHAM PWO-WATER SECTION	OR4100357	OR	Multnomah	66,000	1	15.9	15.9	15.9	7/1/2013	12/31/2013
ROCKWOOD PUD	OR4100668	OR	Multnomah	61,082	1	15.9	15.9	15.9	7/1/2013	12/31/2013
MALDEN WATER DIVISION (MWRA)	MA3165000	MA	Middlesex	59,450	2	19.1	18.5	19.7	7/1/2015	12/31/2015
TIGARD, CITY OF	OR4100878	OR	Washington	57,658	1	15.9	15.9	15.9	7/1/2013	12/31/2013
CHELSEA WATER DEPT. (MWRA)	MA3057000	MA	Suffolk	41,577	1	26.5	26.5	26.5	1/1/2013	12/31/2013
JUNCOS - CEIBA SUR	PR0005166	PR	Juncos	39,460	1	26.0	26.0	26.0	1/1/2013	6/30/2013
WAUSAU WATERWORKS	WI7370102	WI	Marathon	39,106	1	16.0	16.0	16.0	6/1/2014	9/30/2014
MARLBOROUGH DPW WATER DIV.	MA2170000	MA	Middlesex	38,000	1	18.0	18.0	18.0	1/1/2013	6/30/2013
ROY CITY WATER SYSTEM	UTAH29016	UT	Weber	38,000	2	23.7	23.7	23.7	1/1/2014	12/31/2016
GALESBURG	IL0950200	IL	Knox	31,745	1	22.0	22.0	22.0	1/1/2013	12/31/2015
COMMUNITY WATER SYSTEM	AR0000101	AR	Cleburne	31,364	1	25.0	25.0	25.0	1/1/2013	6/30/2013

xxvii Based upon data for action level exceedances that initiated between January 1, 2013 and December 31, 2015. Action level exceedances that occurred before January 1, 2013, but whose compliance period overlapped with the calendar years 2013-2015 were excluded from the listing.

SYSTEM NAME	SYSTEM ID NUMBER	SYSTEM STATE	SYSTEM COUNTY(IES) SERVED	POPULATION SERVED	NUMBER OF ACTION LEVEL EXCEEDANCES	AVERAGE ALE LEVEL (PPB)	MINIMUM ALE LEVEL (PPB)	MAXIMUM ALE LEVEL (PPB)	START DATE OF ALE SAMPLE COLLECTION	END DATE OF ALE SAMPLE COLLECTION
ELIZABETHTON WATER DEPT	TN0000221	TN	Carter	29,390	2	22.0	16.0	28.0	1/1/2014	6/30/2014
MELROSE WATER DEPT. (MWRA)	MA3178000	MA	Middlesex	27,690	1	15.7	15.7	15.7	1/1/2015	12/31/2015
TUALATIN, CITY OF	OR4100906	OR	Washington	26,879	1	15.9	15.9	15.9	7/1/2013	12/31/2013
NEENAH WATERWORKS	WI4710348	WI	Winnebago	25,892	1	18.0	18.0	18.0	6/1/2014	9/30/2014
BANGOR WATER DISTRICT	ME0090110	ME	Penobscot	25,855	1	22.5	22.5	22.5	1/1/2013	6/30/2013
WEST TRAVIS COUNTY REGIONAL WS	TX2270235	TX	Travis	18,408	1	35.5	35.5	35.5	1/1/2013	12/31/2013
NEW CASTLE UTILITIES	IN5233011	IN	Henry	18,000	1	25.1	25.1	25.1	1/1/2014	12/31/2016
WINTHROP WATER DIVISION, (MWRA)	MA3346000	MA	Suffolk	17,497	1	17.4	17.4	17.4	1/1/2013	12/31/2013
HARRISON WATERWORKS	AR0000062	AR	Boone	16,905	2	20.0	17.0	23.0	7/1/2015	12/31/2015
AUBURN WATER DISTRICT	ME0090070	ME	Androscoggin	16,530	2	21.9	20.3	23.4	1/1/2014	12/31/2016
PERU WATER DEPARTMENT	IN5252016	IN	Miami	16,000	1	18.0	18.0	18.0	1/1/2014	12/31/2016
UNH/DURHAM WATER SYS	NH0691010	NH	Strafford	16,000	1	23.0	23.0	23.0	1/1/2014	12/31/2014
CLACKAMAS RIVER WATER - CLAIRMONT	OR4100594	OR	Clackamas	15,371	1	17.0	17.0	17.0	1/1/2013	6/30/2013
STOUGHTON WATERWORKS	WI1130078	WI	Dane	12,698	1	19.0	19.0	19.0	6/1/2014	9/30/2014
MAUNABO URBANO	PR0004815	PR	Maunabo	12,307	1	32.0	32.0	32.0	7/1/2013	12/31/2013
WEST SLOPE WATER DISTRICT	OR4100660	OR	Washington	11,060	1	15.9	15.9	15.9	7/1/2013	12/31/2013
TARRYTOWN WATER SUPPLY	NY5903461	NY	Westchester	11,000	1	15.7	15.7	15.7	1/1/2013	12/31/2015
KENDALLVILLE WATER DEPARTMENT	IN5257008	IN	Noble	9,616	1	50.0	50.0	50.0	1/1/2013	12/31/2015
FIRESTONE TOWN OF	CO0162476	CO	Weld	9,487	4	22.0	15.8	34.1	7/1/2015	12/31/2015
FREDERICK TOWN OF	CO0162288	CO	Weld	9,000	1	15.4	15.4	15.4	1/1/2015	12/31/2015
SUNBELT FWSD HIGH MEADOWS SUBDIVISION	TX1010292	TX	Harris	8,700	1	46.6	46.6	46.6	1/1/2013	12/31/2013
CWS RIVER HILLS S/D (4650006)	SC4650006	SC	York	8,566	1	40.0	40.0	40.0	1/1/2013	12/31/2015
PASQUOTANK CO RO WATER SYSTEM	NC6070000	NC	Pasquotank	8,185	3	56.7	25.0	107.0	1/1/2014	6/30/2014
KINGSBRIDGE MUD	TX0790158	TX	Fort Bend	8,113	1	19.0	19.0	19.0	1/1/2015	12/31/2015
SEBRING VILLAGE PWS	OH5001911	OH	Mahoning	8,100	1	21.0	21.0	21.0	1/1/2013	12/31/2015

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BEDFORD CONSOLIDATED W.D.	NY5903419	NY	Westchester	8,000	1	19.0	19.0	19.0	1/1/2015	12/31/2015
DYESS AIR FORCE BASE	TX2210013	TX	Taylor	7,350	1	16.2	16.2	16.2	1/1/2013	12/31/2013
STERLING WATER DEPARTMENT	MA2282000	MA	Worcester	7,000	2	20.5	16.0	25.0	7/1/2013	12/31/2013
BURNT HILLS-BALLSTON LK WD	NY4505658	NY	Saratoga	6,942	1	34.0	34.0	34.0	1/1/2013	12/31/2013
NCSA - WINTERGREEN	VA2125910	VA	Nelson	6,714	1	92.0	92.0	92.0	1/1/2013	6/30/2013
NOTTINGHAM COUNTRY MUD	TX1012315	TX	Harris	6,633	1	22.0	22.0	22.0	1/1/2013	12/31/2015
BIG CANOE SUBDIVISION	GA2270004	GA	Pickens	6,396	1	25.0	25.0	25.0	1/1/2013	12/31/2015
RENSSELAER WATER DEPARTMENT	IN5237005	IN	Jasper	5,912	1	16.3	16.3	16.3	1/1/2014	12/31/2016
LAKE PROVIDENCE WATER SYSTEM	LA1035002	LA	East Carroll	5,850	1	16.0	16.0	16.0	1/1/2015	12/31/2015
BUFFALO TWP MUN AUTH FREEPORT	PA5030019	PA	Armstrong	5,849	1	18.4	18.4	18.4	6/1/2013	9/30/2013
SARANAC LAKE V	NY1600011	NY	Franklin	5,800	1	34.0	34.0	34.0	1/1/2014	6/30/2014
MCCURTAIN CO RWD #8 (MT. FORK WATER)	OK1010207	OK	McCurtain	5,685	1	18.4	18.4	18.4	7/1/2015	12/31/2015
TDCJ CHASE FIELD	TX0130002	TX	Bee	5,660	1	27.3	27.3	27.3	1/1/2013	12/31/2013
VALLEY CENTER, CITY OF	KS2017318	KS	Sedgwick	5,654	1	19.0	19.0	19.0	1/1/2013	12/31/2015
POTOSI WSC	TX2210008	TX	Taylor	5,595	1	19.7	19.7	19.7	1/1/2013	12/31/2013
TULALIP BAY WATER DIST #1	1.05E+08	EPA Region 10	-	5,439	1	16.0	16.0	16.0	1/1/2014	12/31/2014
BERTHOUD TOWN OF	CO0135138	CO	Larimer	5,400	2	30.0	30.0	30.0	1/1/2015	12/31/2016
WESTADOR MUD	TX1010277	TX	Harris	5,310	1	15.4	15.4	15.4	1/1/2013	12/31/2013
LAKE MILLS WATERWORKS	WI1280108	WI	Jefferson	5,300	2	63.0	51.0	75.0	1/1/2015	6/30/2015
TEXAS STATE TECHNICAL COLLEGE - WACO	TX1550138	TX	McLennan	5,250	1	19.2	19.2	19.2	1/1/2013	12/31/2013
SOUTH ELIZABETHTON UTILITY DIS	TN0000646	TN	Carter	5,115	2	22.0	16.0	28.0	1/1/2014	6/30/2014
ADOC EYMAN UNIT	AZ0411705	AZ	Pinal	5,100	2	37.5	20.0	55.0	1/1/2014	6/30/2014
DAUPHIN ISLAND WATER & SEWER	AL0000971	AL	Mobile	4,902	1	20.0	20.0	20.0	1/1/2013	12/31/2013
WAUPUN CORRECTIONAL INST	WI1140142	WI	Dodge	4,901	1	20.0	20.0	20.0	6/1/2014	9/30/2014

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DEUEL VOCATIONAL INSTITUTION	CA3910800	CA	San Joaquin	4,544	1	100.0	100.0	100.0	1/1/2013	12/31/2015
RALEIGH WATER DISTRICT	OR4100667	OR	Washington	4,500	1	15.9	15.9	15.9	7/1/2013	12/31/2013
CITY OF JACKSBORO	TX1190002	TX	Jack	4,342	1	20.0	20.0	20.0	1/1/2014	12/31/2014
BUFFALO, CITY OF	WY5600005	WY	Johnson	4,200	1	37.0	37.0	37.0	1/1/2013	12/31/2015
OKLA ORDNANCE WORKS AUTHORITY	OK1021602	OK	Mayes	4,000	1	21.4	21.4	21.4	1/1/2013	12/31/2015
CITY OF COLORADO CITY	TX1680001	TX	Mitchell	3,936	1	63.0	63.0	63.0	1/1/2014	12/31/2014
WHISPERING PINES DEVELOPMENT	NC0363112	NC	Moore	3,822	2	32.0	27.0	37.0	7/1/2013	12/31/2013
FORT BRANCH WATER DEPARTMENT	IN5226001	IN	Gibson	3,780	1	16.1	16.1	16.1	1/1/2014	12/31/2014
CITY OF WEST TAWAKONI	TX1160012	TX	Hunt	3,720	1	16.2	16.2	16.2	1/1/2013	12/31/2013
WHITE PINE WATER SYSTEM	TN0000746	TN	Jefferson	3,688	1	29.2	29.2	29.2	1/1/2013	12/31/2015
KIEL WATERWORKS	WI4360427	WI	Manitowoc	3,630	1	19.0	19.0	19.0	6/1/2014	9/30/2014
OSU INSTITUTE OF TECHNOLOGY	OK3005625	OK	Okmulgee	3,606	1	73.0	73.0	73.0	1/1/2013	6/30/2013
VILLAGE OF SURFSIDE BEACH	TX0200037	TX	Brazoria	3,477	1	42.3	42.3	42.3	1/1/2015	12/31/2015
GREENWOOD LAKE VILLAGE	NY3503530	NY	Orange	3,411	1	16.0	16.0	16.0	1/1/2015	6/30/2015
BIG VALLEY RANCHERIA WATER DISTRICT	90605164	EPA Region 9	-	3,135	1	39.0	39.0	39.0	7/1/2015	12/31/2015
CITY OF STAMFORD	TX1270003	TX	Jones	3,124	3	19.2	17.9	20.0	7/1/2015	12/31/2015
HARRIS COUNTY WCID FONDREN ROAD	TX1010249	TX	Harris	3,078	1	61.3	61.3	61.3	1/1/2013	12/31/2015
LAKE GROVE WATER DISTRICT	OR4100460	OR	Clackamas	3,000	1	15.9	15.9	15.9	7/1/2013	12/31/2013
DILLON TOWN OF	CO0159035	CO	Summit	2,992	3	26.0	21.0	32.0	7/1/2014	12/31/2014
GRAND LAKES MUD 4	TX0790356	TX	Fort Bend	2,973	1	16.0	16.0	16.0	1/1/2013	12/31/2015
EAST DUNDEE	IL0890250	IL	Kane	2,860	1	127.0	127.0	127.0	7/1/2014	12/31/2014
LAUGHLIN AIR FORCE BASE	TX2330006	TX	Val Verde	2,790	1	20.0	20.0	20.0	1/1/2014	12/31/2014
PLATTEVILLE TOWN OF	CO0162615	CO	Weld	2,740	2	16.0	16.0	16.0	1/1/2014	6/30/2014
BRIDGEPORT	IL1010100	IL	Lawrence	2,734	1	51.1	51.1	51.1	7/1/2013	12/31/2013
LONGS PEAK WD	CO0107486	CO	Boulder	2,700	1	18.0	18.0	18.0	1/1/2014	12/31/2016
BROCKWAY SANITARY DIST 1	WI6270299	WI	Jackson	2,692	1	26.0	26.0	26.0	6/1/2014	9/30/2014

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SANTA FE COUNTY WEST SECTOR	NM3500926	NM	Santa Fe	2,690	1	30.0	30.0	30.0	1/1/2014	12/31/2014
SIAM UTILITY DISTRICT	TN0000633	TN	Carter	2,595	2	22.0	16.0	28.0	1/1/2014	6/30/2014
PORT ALLEGANY WATER DEPARTMENT	PA6420021	PA	McKean	2,591	1	20.6	20.6	20.6	6/1/2013	9/30/2013
LAURADALE S/D	NC0467136	NC	Onslow	2,586	1	17.1	17.1	17.1	1/1/2014	6/30/2014
CITY OF RANGER	TX0670004	TX	Eastland	2,565	1	29.0	29.0	29.0	7/1/2014	12/31/2014
EASTERN LOUISIANA MENTAL HEALTH SYSTEMS	LA1037005	LA	East Feliciana	2,500	1	36.0	36.0	36.0	1/1/2013	12/31/2015
NORTH CASTLE WD #1	NY5903445	NY	Westchester	2,500	1	42.6	42.6	42.6	1/1/2014	12/31/2016

APPENDIX 4

100 COMMUNITY WATER SYSTEMS WITH HIGHEST LEAD ACTION LEVEL EXCEEDANCES (ALES) IN 2013–2015[xxviii]

Note that NRDC has obtained these data directly from EPA's Safe Drinking Water Information System, which the agency compiles from data submitted by state regulators in accordance with EPA rules. NRDC has not independently verified these data.

RANKED BY HIGHEST AVERAGE ACTION LEVEL EXCEEDANCE, HIGHEST CONCENTRATION FIRST

SYSTEM NAME	SYSTEM ID NUMBER	SYSTEM STATE	SYSTEM COUNTY(IES) SERVED	POPULATION SERVED	NUMBER OF ACTION LEVEL EXCEEDANCES	AVERAGE ALE LEVEL (PPB)	MINIMUM ALE LEVEL (PPB)	MAXIMUM ALE LEVEL (PPB)	START DATE OF ALE SAMPLE COLLECTION	END DATE OF ALE SAMPLE COLLECTION
COTTONWOOD MUTUAL	UTAH15013	UT	Morgan	1,675	1	6,000.0	6,000.0	6,000.0	1/1/2013	12/31/2015
MATTAWAN	MI0004177	MI	Van Buren	2,037	1	4,700.0	4,700.0	4,700.0	1/1/2013	12/31/2015
LAWRENCE	MI0003820	MI	Van Buren	1,045	1	2,900.0	2,900.0	2,900.0	1/1/2013	12/31/2015
ACUED. RURAL DE TEJAS	PR0677016	PR	Yabucoa	1,892	1	1,650.0	1,650.0	1,650.0	7/1/2013	12/31/2013
PAINT TOWNSHIP MUN WATER AUTH	PA6160044	PA	Clarion	40	1	1,273.0	1,273.0	1,273.0	6/1/2014	9/30/2014
TIMBERLAND MHC	OK4005573	OK	Oklahoma	200	1	1,190.0	1,190.0	1,190.0	1/1/2013	12/31/2013
BOSTIAN HEIGHTS WTR SYSTEM	NC0180104	NC	Rowan	109	1	1,030.0	1,030.0	1,030.0	1/1/2014	12/31/2016
KEESEVILLE COUNTRY GARDENS	NY0917769	NY	Clinton	58	2	1,005.8	611.5	1,400.0	1/1/2015	6/30/2015
EVERGREEN TERRACE WATER ASSOCIATION	ID1050010	ID	Benewah	68	1	990.0	990.0	990.0	1/1/2013	6/30/2013
FREEDOM VILLAGE CONDOS	NH0862030	NH	Carroll	165	2	898.5	137.0	1,660.0	7/1/2014	12/31/2014
MOOSUP GARDEN APARTMENTS	CT1090221	CT	Windham	210	1	336.0	336.0	336.0	1/1/2015	12/31/2015
SUNDOWNER WEST MOBILE HOME PARK	KS2016910	KS	Saline	220	2	332.0	16.8	647.2	7/1/2015	12/31/2015
WOODSTOCK JOB CORPS CENTER	MD0030012	MD	Baltimore	675	1	315.0	315.0	315.0	1/1/2013	12/31/2015
KELLEY CREST	WA5329441	WA	Cowlitz	45	2	274.0	274.0	274.0	1/1/2015	12/31/2015
BRINTON MANOR	PA1230006	PA	Delaware	196	1	271.0	271.0	271.0	6/1/2013	9/30/2013
BAXTER FARMS COMMUNITY WATER ASSOC	CT1420021	CT	Tolland	175	1	250.0	250.0	250.0	1/1/2013	12/31/2015
NORTH CARTER LAKE WD	CO0135553	CO	Larimer	293	2	240.5	240.5	240.5	1/1/2015	12/31/2016
WINHALL ACRES	VT0005629	VT	Bennington	84	2	234.5	43.0	426.0	7/1/2015	12/31/2015
BEULAH WATER WORKS DISTRICT	CO0151100	CO	Pueblo	355	1	230.0	230.0	230.0	1/1/2014	12/31/2016

xxviii Based upon data for action level exceedances that initiated between January 1, 2013 and December 31, 2015. Action level exceedances that occurred before January 1, 2013, but whose compliance period overlapped with the calendar years 2013-2015 were excluded from the listing.

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CHARLES E. JOHNSON CORRECTIONAL CENTER	OK3007608	OK	Woods	444	2	224.0	169.0	279.0	7/1/2015	12/31/2015
HOMESTEAD S/D WATER SYSTEM	NC0118241	NC	Catawba	389	1	223.0	223.0	223.0	1/1/2014	12/31/2016
Monument Valley Utah Schools	NN4900227	Navajo Nation	-	330	1	212.3	212.3	212.3	1/1/2014	12/31/2016
LUQUILLO URBANO	PR0005316	PR	Luquillo	0*	1	211.0	211.0	211.0	7/1/2014	12/31/2014
DOUGLAS	OK3002414	OK	Garfield	32	2	208.7	39.4	378.0	7/1/2015	12/31/2015
WINTERPLACE WATER SYSTEM	VT0005635	VT	Windsor	700	2	200.0	200.0	200.0	1/1/2014	12/31/2016
COUNTRY GREEN ESTATES	WA5315483	WA	Pierce	66	1	163.0	163.0	163.0	7/1/2013	12/31/2013
LAZY K CAMPGROUND	PA3060105	PA	Berks	75	1	152.0	152.0	152.0	7/1/2014	12/31/2014
ARROWHEAD BY THE LAKE ASSOCIATION, INC.	CT1669011	CT	New Haven	288	3	151.0	16.0	297.0	7/1/2015	12/31/2016
WESTSIDE GREENWOOD LAKE W.D.	NY3503566	NY	Orange	1,160	1	140.0	140.0	140.0	1/1/2013	12/31/2015
MARSHALL WATER WORKS	IN5261003	IN	Parke	378	1	131.0	131.0	131.0	1/1/2013	12/31/2015
JIMINY PEAK RESORT	MA1121004	MA	Berkshire	1,000	1	130.0	130.0	130.0	1/1/2013	12/31/2015
EAST DUNDEE	IL0890250	IL	Kane	2,860	1	127.0	127.0	127.0	7/1/2014	12/31/2014
LAWRENCEVILLE SCHOOL	NJ1107001	NJ	Mercer	1,000	1	124.0	124.0	124.0	1/1/2013	6/30/2013
KIRK GLEN S/D	NC0111149	NC	Buncombe	92	1	123.0	123.0	123.0	7/1/2015	12/31/2015
SNUG HARBOR SUBDIVISION	TX0200053	TX	Brazoria	99	1	122.0	122.0	122.0	1/1/2013	12/31/2013
HARRIS SPRINGS RANCH	NV0001080	NV	Clark	40	1	120.0	120.0	120.0	1/1/2014	12/31/2016
UAW FAMILY EDUCATION CENTER	MI0006705	MI	Cheboygan	450	1	117.0	117.0	117.0	1/1/2013	12/31/2015
CEDAR LAKE CONDO	NC0319128	NC	Chatham	84	3	115.3	16.0	210.0	1/1/2014	6/30/2014
MILTON ROAD WATER COMPANY	CA2801080	CA	Napa	55	1	111.5	111.5	111.5	1/1/2014	12/31/2014
GREENTOWN MUNICIPAL WATER	IN5234006	IN	Howard	2,415	1	110.0	110.0	110.0	1/1/2013	12/31/2015
MOUNTAIN GREEN CONDOMINIUM	VT0005539	VT	Rutland	1,300	1	110.0	110.0	110.0	1/1/2014	6/30/2014
CANONCITO AT APACHE CANYON	NM3510026	NM	Santa Fe	250	1	110.0	110.0	110.0	1/1/2014	12/31/2016
WESTBANK MESA HOA	CO0123836	CO	Garfield	93	1	110.0	110.0	110.0	1/1/2014	6/30/2014
SALMON RIVER RV PARK	OR4192048	OR	Lincoln	45	1	110.0	110.0	110.0	7/1/2013	12/31/2013

* According to the 2015 Quarter 3 data set of the Safe Drinking Water Information System, this system served 12,051 people.

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WESTMONT MOBILE HOME COMMUNITY	TX1700490	TX	Montgomery	309	1	109.1	109.1	109.1	1/1/2015	12/31/2015
OAKS THE	WI4150213	WI	Door	95	1	103.6	103.6	103.6	1/1/2014	6/30/2014
PINE TERRACE MOBILE HOME PARK	PA3540042	PA	Schuylkill	50	2	100.3	32.5	168.0	1/1/2015	6/30/2015
DEUEL VOCATIONAL INSTITUTION	CA3910800	CA	San Joaquin	4,544	1	100.0	100.0	100.0	1/1/2013	12/31/2015
MAPLE RIDGE MOBILE HOME PARK	ME0095340	ME	Penobscot	110	3	98.3	95.0	100.0	1/1/2014	12/31/2016
OKLAHOMA VETERANS CENTER	OK3003906	OK	Latimer	175	1	97.4	97.4	97.4	1/1/2014	6/30/2014
GOLDEN EAGLE WATER USERS ASSN	MT0002840	MT	Yellowstone	125	1	97.0	97.0	97.0	1/1/2013	12/31/2015
THE JEFFERSON SCHOOL	MD1100054	MD	Frederick	54	1	97.0	97.0	97.0	1/1/2014	12/31/2014
WEST BURKE HOUSING	VT0005555	VT	Caledonia	40	2	97.0	97.0	97.0	1/1/2014	12/31/2016
SCARBOROUGH GARDENS	ME0091416	ME	Cumberland	45	2	92.5	85.0	100.0	7/1/2015	12/31/2016
NCSA - WINTERGREEN	VA2125910	VA	Nelson	6,714	1	92.0	92.0	92.0	1/1/2013	6/30/2013
MELROSE MHP	NC0465135	NC	New Hanover	50	1	91.8	91.8	91.8	1/1/2014	12/31/2016
WHITE ROCK MOBILE HOME PARK	PA2450038	PA	Monroe	50	1	89.0	89.0	89.0	1/1/2013	6/30/2013
BURLINGTON APARTMENTS	IN5208012	IN	Carroll	25	1	86.7	86.7	86.7	1/1/2014	12/31/2016
GIDEON GROVE TP NO 1	NC0279692	NC	Rockingham	71	1	85.0	85.0	85.0	1/1/2013	12/31/2013
HOPEWELL SERVICES INC	NY1302764	NY	Dutchess	500	1	84.7	84.7	84.7	1/1/2014	12/31/2014
EDGEHILL	GA1250004	GA	Glascock	30	1	83.6	83.6	83.6	1/1/2013	12/31/2013
ROYAL OAKS HOMEOWNERS ASSN., INC.	IN5291019	IN	White	390	1	83.5	83.5	83.5	1/1/2013	12/31/2013
WOODBURY W.D. #6 (AMDUR PARK)	NY3503570	NY	Orange	183	1	83.2	83.2	83.2	1/1/2013	12/31/2015
LITTLE SWITZERLAND	NY1302803	NY	Dutchess	400	1	81.0	81.0	81.0	1/1/2015	12/31/2015
LAKEVIEW WATER SYSTEM	LA1017019	LA	Caddo	1,971	1	80.0	80.0	80.0	1/1/2013	12/31/2015
CATHEDRAL HILLS MWC, INC	CA4400652	CA	Santa Cruz	60	1	80.0	80.0	80.0	1/1/2015	12/31/2017
NATIVE VILLAGE OF SLEETMUTE	AK2271874	AK	Bethel	82	1	76.5	76.5	76.5	1/1/2013	12/31/2015
SEMINOLE CO RW&SWMD #3	OK3006703	OK	Seminole	337	1	74.0	74.0	74.0	1/1/2015	12/31/2015
OSU INSTITUTE OF TECHNOLOGY	OK3005625	OK	Okmulgee	3,606	1	73.0	73.0	73.0	1/1/2013	6/30/2013

SYSTEM NAME	SYSTEM ID NUMBER	SYSTEM STATE	SYSTEM COUNTY(IES) SERVED	POPULATION SERVED	NUMBER OF ACTION LEVEL EXCEEDANCES	AVERAGE ALE LEVEL (PPB)	MINIMUM ALE LEVEL (PPB)	MAXIMUM ALE LEVEL (PPB)	START DATE OF ALE SAMPLE COLLECTION	END DATE OF ALE SAMPLE COLLECTION
PARSON HILL PARTNERSHIP	VT0005584	VT	Rutland	32	2	72.0	70.0	74.0	7/1/2015	12/31/2015
SPRINGRIDGE SUBD	CO0123718	CO	Garfield	110	1	71.6	71.6	71.6	7/1/2013	12/31/2013
VILLAS AT GEORGETOWN	PA7360184	PA	Lancaster	30	5	70.9	30.5	200.5	1/1/2015	6/30/2015
ROSWELL CORRECTIONAL CENTER	NM3552803	NM	Chaves	340	1	70.0	70.0	70.0	1/1/2014	12/31/2014
PORTER CREEK DWID	AZ0409013	AZ	Navajo	300	1	70.0	70.0	70.0	1/1/2013	12/31/2015
RAINBOW MOBILE HOME PARK	GA2370092	GA	Putnam	31	2	70.0	70.0	70.0	1/1/2015	12/31/2017
LOG CABIN COURT	PA7360004	PA	Lancaster	175	1	69.5	69.5	69.5	6/1/2013	9/30/2013
CURRYVILLE	MO2010201	MO	Pike	255	2	69.1	69.1	69.1	1/1/2014	12/31/2016
WAVERLY	MO1010839	MO	Lafayette	840	1	69.0	69.0	69.0	7/1/2013	12/31/2013
THOMPSON HILL WATER CO - PAULA LANE DIV	CT1410661	CT	Windham	85	4	68.5	50.0	87.0	1/1/2014	6/30/2014
SEDONA VENTURE WATER COMPANY	AZ0413108	AZ	Yavapai	700	2	65.4	65.4	65.4	1/1/2015	12/31/2017
LAKE ALLURE SUBDIVISION - ASHLAND	NE3121353	NE	Saunders	75	1	65.2	65.2	65.2	7/1/2014	12/31/2014
COTSWOLD WATER SUPPLY	NY5920706	NY	Westchester	150	1	65.1	65.1	65.1	1/1/2014	12/31/2016
CHEROKEE	OK2000208	OK	Alfalfa	1,630	2	63.5	63.5	63.5	1/1/2015	12/31/2017
LAKE MILLS WATERWORKS	WI1280108	WI	Jefferson	5,300	2	63.0	51.0	75.0	1/1/2015	6/30/2015
CITY OF COLORADO CITY	TX1680001	TX	Mitchell	3,936	1	63.0	63.0	63.0	1/1/2014	12/31/2014
HARRIS COUNTY WCID FONDREN ROAD	TX1010249	TX	Harris	3,078	1	61.3	61.3	61.3	1/1/2013	12/31/2015
JUBILEE MHP	PA7360108	PA	Lancaster	30	1	60.5	60.5	60.5	6/1/2013	9/30/2013
CTWC - LONDON PARK DIVISION	CT0670011	CT	Tolland	221	1	60.0	60.0	60.0	1/1/2013	12/31/2015
OAKWOOD COMMUNITY ASSOCIATION, INC.	IN5201009	IN	Adams	120	1	60.0	60.0	60.0	1/1/2013	12/31/2015
ANASAZI TRAILS WATER CO-OP	NM3501523	NM	Sandoval	75	1	60.0	60.0	60.0	1/1/2014	12/31/2016
HODGDON HOMESTEAD	ME0094503	ME	Aroostook	33	1	60.0	60.0	60.0	1/1/2013	6/30/2013
MADDEN ESTATES	MA2323002	MA	Worcester	50	3	59.8	22.5	131.0	1/1/2015	6/30/2015
LIVERMORE WATER SUPPLY	IA4647090	IA	Humboldt	384	1	59.0	59.0	59.0	1/1/2015	6/30/2015
LOCUST GROVE RETIREMENT HOME	PA4340016	PA	Juniata	177	2	58.2	16.5	100.0	7/1/2014	12/31/2014
CWS FOXWOOD (4650008)	SC4650008	SC	York	520	1	57.0	57.0	57.0	1/1/2013	12/31/2015

SYSTEM NAME	SYSTEM ID NUMBER	SYSTEM STATE	SYSTEM COUNTY(IES) SERVED	POPULATION SERVED	NUMBER OF ACTION LEVEL EXCEEDANCES	AVERAGE ALE LEVEL (PPB)	MINIMUM ALE LEVEL (PPB)	MAXIMUM ALE LEVEL (PPB)	START DATE OF ALE SAMPLE COLLECTION	END DATE OF ALE SAMPLE COLLECTION
ARCADY BAY ESTATES	NY5618220	NY	Warren	350	1	57.0	57.0	57.0	1/1/2015	6/30/2015
VENICE RANCH MOBILE HOME ESTATES	FL6581900	FL	Sarasota	295	1	57.0	57.0	57.0	1/1/2015	12/1/2015
Windsor Oaks Development	MN1710015	MN	Sherburne	80	1	57.0	57.0	57.0	7/1/2014	12/31/2014
ORANGEWOOD MOBILE HOME PARK	FL3640955	FL	Volusia	67	1	56.8	56.8	56.8	7/1/2013	12/1/2013
PASQUOTANK CO RO WATER SYSTEM	NC6070000	NC	Pasquotank	8,185	3	56.7	25.0	107.0	1/1/2014	6/30/2014

METHODS FOR DATA ANALYSIS

Calculations of populations and systems impacted by violations to the Lead and Copper Rule or action level exceedances

The Safe Drinking Water Information System is an EPA-maintained database that includes state-reported information about drinking water systems and their violations of federal drinking water laws. EPA regulations[xxix] require primacy states to report violations and enforcement actions to the EPA quarterly. To calculate the populations and systems impacted by violations of the Lead and Copper Rule, we downloaded drinking water data from the violations tab of the 2016 Quarter 1 data set from the EPA Safe Drinking Water Information System on April 27, 2016.[xxx]

For population values and mapping, data were limited to public water systems that were active in the 2016 Quarter 1 data set and included systems with violations between January 1, 2015 and December 31, 2015. For systems with unresolved "open" violations (those with no fixed compliance period), data were downloaded from the Safe Drinking Water Information System for either all violations regardless of date or were limited to those that had a start date between January 1, 2013 and December 31, 2015. Data for community water systems with violations of the Lead and Copper Rule were extracted from the original data through Microsoft Excel filtering tools. To remove duplicate entries for "open" violations, a unique violation ID number was created for each system using a combination of the public water system identification (PWS ID) number and Violation ID fields in the Safe Drinking Water Information System. Safe Drinking Water Information System data fields include PWS ID, PWS Name, EPA Region, Primacy Agency, PWS Type, Primacy Type, Primary Source, Activity Status, Deactivation Date, Population Served Count, Rule Name, Violation Code, Violation Type, Violation Category Code, Is Health Based, Contaminant Name, Compliance Period Begin Date, Compliance Period End Date, Compliance Status, Return to Compliance (RTC) Date, Enforcement Action Type Code, Enforcement Action Description, Is Major Violation, Severity Indicator Count, Public Notification Tier, Is School or Daycare, and Violation ID. Each system and population was counted only once for total number of systems and population served.

To calculate the populations served by systems with action level exceedances for lead, drinking water data from Lead and Copper Report tab of the 2016 Quarter 1 data set of the EPA Safe Drinking Water Information System were downloaded on April 27, 2016. Action level exceedances occur when the concentration of lead in 90th percentile of sampled taps in a specific drinking water system exceed 15 ppb of lead. Data were limited to public water systems that were active between January 1, 2013 and December 31, 2015. ALE data were then subdivided into two groups – systems with compliance periods that overlapped with the January 1, 2013 to December 31, 2015 timeframe or had an ALE that initiated after January 1, 2013 or before December 31, 2015. Safe Drinking Water Information System data fields included the EPA Region, Submission Year, Submission Quarter, Public Water System (PWS) ID, PWS Name, Primacy Agency Code, Contaminant Name, Sample Measure (mg/L), Sampling Start Date, Sampling End Date, PWS Activity Code, PWS Type Code, Owner Type Description, Primacy Type Description, Population Served Count, Primary Source Code, PWS Deactivation Date, Season Begin Date, Season End Date, Is Wholesaler, Is School or Daycare, and Service Connections Count.[xxxi] Each system and population was counted only once for total number of systems and population served.

Geographic representation of populations impacted by Lead and Copper Rule violations and action level exceedances

To map violations of the Lead and Copper Rule, county-level information was obtained from the Geographic Area tab of the Quarter 1 2016 data set of the EPA Safe Drinking Water Information System, and violations were mapped using the free, open-source geographic information system (GIS) software QGIS. For systems with city-level information only, counties were identified through web searches for county locations or by joining X,Y coordinates for city locations with county layers in QGIS.

County- and state-level 20m-resolution cartographic boundary shapefiles for geographic visualization of drinking water violations or action level exceedances were obtained from the 2015 U.S. Census Bureau's Master Address File/Topologically Integrated Geographic Encoding and Referencing (MAF/TIGER) system.[xxxii]

For Figure 1, populations served by systems with violations of the Lead and Copper Rule in each county were calculated by grouping violating systems by county and summing the populations for each violating system. For systems serving multiple counties, populations served by systems with violations were included in the population totals for each county served. Populations were not double-counted for aggregate populations served (i.e., total U.S. population served by systems with health-based violations of the Lead and Copper Rule).

xxix *See* 40 CFR 142.15(a).

xxx Available online at www.epa.gov/your-drinking-water/safe-drinking-water-information-system-sdwis-federal-reporting-services.

xxxi PWS = public water system

xxxii 20m indicates a 1:20,000,000 resolution level shapefile.

Violations in Figure 1 include both monitoring and reporting and treatment technique violations. Specific violation types include: Follow-up or Routine LCR Tap M/R; Water Quality Parameter M/R; Initial Tap Sampling for Pb and Cu; Lead Consumer Notice; Initial, Follow-up, or Routine Source Water M/R; OCCT/SOWT Treatment Installation/Demonstration; MPL Non-Compliance; Public Education; Lead Service Line Replacement (LSLR); OCCT/SOWT Study/Recommendation; and WQP Entry Point/Tap Treatment Technique Non-Compliance.[xxxiii]

For Figure 2, populations served by systems with health-based violations of the Lead and Copper Rule in each county were calculated by grouping violating community water systems by county and summing the populations for each violating system. For systems serving multiple counties, populations served by systems with violations were included in the population totals for each county served. Populations were not double-counted for aggregate populations served (i.e., total U.S. population served by systems with health-based violations of the Lead and Copper Rule).

Violations reflected in Figure 2 are a subset of the violations in Figure 1, and include only those violations designated as health-based in the Safe Drinking Water Information System "Is Health Based" field. Specific violation types were treatment technique–related only and included: Optimized Corrosion Control Treatment/Source Water Treatment (OCCT/SOWT), Treatment Installation/Demonstration, Maximum Permissible Level (MPL) Non-Compliance, Public Education, Lead Service Line Replacement (LSLR), OCCT/SOWT Study/Recommendation, and Water Quality Parameter (WQP) Entry Point/Tap Treatment Technique Non-Compliance.

For Figure 3, populations served by systems with action level exceedances in each county were calculated by grouping violating community water systems by county and summing the populations for each system with an action level exceedance. For systems serving multiple counties, populations served by systems with action level exceedances were included in the population totals for each county served. Populations were not double-counted for aggregate populations served (i.e., total U.S. population served by community systems with action level exceedances).

Populations served by systems with unobtainable county-level information (e.g., some tribal lands) were not included in the mapped populations served, but the populations were included in the aggregate population- and system-level totals (e.g., total number of community water systems or total U.S. population served by systems with violations of the Lead and Copper Rule).

Calculations of enforcement actions and compliance rates for systems in violation of the Lead and Copper Rule

Enforcement actions were obtained from the Safe Drinking Water Information System "Enforcement Action Description" field. Enforcement actions taken between January 1, 2015, and December 31, 2015, included: Federal Complaint for Penalty Consent Order or Consent Decree, Federal Proposed Administrative Order issued, Federal Complaint for Penalty issued, Federal Formal Notice of Violation issued, Federal Final Administrative Order issued, Federal Consent Decree/Judgment, Federal no additional Formal Action needed, Federal Compliance achieved, Federal Variance/Exemption issued, State Civil Case concluded, State Case appealed, State Case dropped, State Hook-up/Extension Ban, State Public Notification issued, State Formal Notice of Violation issued, State Bilateral Compliance Agreement signed, State Administrative/Compliance Order without penalty issued, State Administrative Penalty assessed, State Show-Cause hearing, State Administrative/Compliance Order with penalty issued, State Civil Case under development, State Civil Case filed in State court, State Consent Decree/Judgment, State Violation/Reminder Notice, State Compliance Meeting conducted, State Technical Assistance Visit, State Site Visit for enforcement purposes, State Public Notification requested, State Public Notification received, State no additional Formal Action needed, State Intentional no-action, State Other, State Compliance achieved, and State Variance/Exemption issued. Enforcement action totals were calculated using Microsoft Excel PivotTables.

To differentiate between formal and informal enforcement actions, formal enforcement actions were identified using definitions established in the 2009 EPA document "Proposed Revision to Enforcement Response Policy for the Public Water System Supervision (PWSS) Program Under the Safe Drinking Water Act and Implementation of the Enforcement Targeting Tool."[xxxiv]

xxxiii LCR = Lead and Copper Rule, M/R = monitoring and reporting, Pb = lead, Cu = copper, OCCT = Optimal Corrosion Control Treatment, SOWT = Source Water Treatment, MPL = Maximum Permissible Level, WQP = Water Quality Parameter.

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