ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 141 and 142

[EPA–HQ–OW–2017–0300; FRL–10019–23–OW]

RIN 2040–AF15

National Primary Drinking Water Regulations: Lead and Copper Rule Revisions

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency (EPA) is publishing final regulatory revisions to the National Primary Drinking Water Regulation (NPDWR) for lead and copper under the authority of the Safe Drinking Water Act (SDWA). These revised requirements provide greater and more effective protection of public health by reducing exposure to lead and copper in drinking water. The rule will better identify high levels of lead, improve the reliability of lead tap sampling results, strengthen corrosion control treatment requirements, expand consumer awareness and improve risk communication. This final rule requires, for the first time, community water systems to conduct lead-in-drinking-water testing and public education in schools and child care facilities. In addition, the rule will accelerate lead service line replacements by closing existing regulatory loopholes, propelling early action, and strengthening replacement requirements.

DATES:

Effective date: This final rule is effective as of March 16, 2021. For judicial review purposes, this final rule is promulgated as of January 15, 2021.

Compliance dates: The compliance date for the revisions to 40 CFR part 141, subpart I, is set forth in § 141.80(a). The compliance date for the revisions to 40 CFR 141.2 is January 16, 2024, and the compliance date for 40 CFR 141.31 is January 16, 2024. The compliance date for changes made to 40 CFR part 141, subpart O (40 CFR 141.153(d)(4)(vi) and (xi) and 141.154(d)(1)), is January 16, 2024. The compliance date for changes made to 40 CFR part 141, subpart Q (§ 141.202 and appendices A and B), is January 16, 2024.

ADDRESSES: EPA has established a docket for this action under Docket ID No. EPA–HQ–OW–2017–0300. All documents in the docket are listed on the *http://www.regulations.gov* website. Although listed in the index, some information is not publicly available, *e.g.,* Confidential Business Information or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the internet and will be publicly available only in hard copy form.

FOR FURTHER INFORMATION CONTACT: Jeffrey Kempic, Standards and Risk Management Division, Office of Ground Water and Drinking Water, U.S. Environmental Protection Agency, 1200 Pennsylvania Ave. NW, Mail Code 4607M, Washington, DC 20460; telephone number: (202) 564–4880 (TTY 800–877–8339); email address: *Kempic.Jeffrey@EPA.gov.* For more information visit *https://www.epa.gov/dwreginfo/lead-and-copper-rule.*

SUPPLEMENTARY INFORMATION:

I. General Information

The United States has made tremendous progress in lowering children's blood lead levels. As a result of multiple Federal laws and regulations, including the 1973 phase-out of lead in automobile gasoline (40 CFR part 80, subpart B), the 1978 Federal regulation banning lead paint for residential and consumer use (16 CFR part 1303), the 1991 LCR (40 CFR part 141, subpart I), and the 1995 ban on lead in solder in food cans (21 CFR 189.240), the median concentration of lead in the blood of children aged 1 to 5 years dropped from 15 micrograms (µg) per deciliter in 1976–1980 to 0.7 µg per deciliter in 2015–2016, a decrease of 95 percent (USEPA, 2019a).

Although childhood blood lead levels have been substantially reduced as a result of these actions, exposure to lead in the environment continues to be a concern, especially for vulnerable populations such as children and pregnant women. Data evaluated by the National Toxicology Program (NTP, 2012) demonstrates that there is sufficient evidence to conclude that there are adverse health effects associated with low-level lead exposure. Moreover, no safe blood lead level in children has been identified (*https://www.cdc.gov/nceh/lead/prevention/default.htm*). Sources of lead include lead-based paint, drinking water, and soil contaminated by historical sources. The Federal Action Plan (Action Plan) to Reduce Childhood Lead Exposures and Associated Health Impacts, issued in December 2018, provides a blueprint for reducing further lead exposure and associated harm through collaboration among Federal agencies and with a range of stakeholders, including states, tribes, and local communities, along with businesses, property owners, and parents. The Action Plan is the product of the President's Task Force on Environmental Health Risks and Safety Risks to Children (Task Force). The Task Force is comprised of 17 Federal departments and offices including the U.S. Department of Health and Human Services (HHS) and the U.S Department of Housing and Urban Development, which co-chaired the development of the Action Plan with EPA.

Through this plan, EPA committed to reducing lead exposures from multiple sources including paint, ambient air, and soil and dust contamination, especially to children who are among the most vulnerable to the effects of lead.

On June 21, 2019, EPA announced new, tighter standards for lead in dust on floors and windowsills to protect children from the harmful effects of lead exposure. The standards were lowered from 40 µg of lead in dust per square foot (ft^2) on floors and 250 µg of lead in dust per ft^2 on interior windowsills, to 10 µg/ft^2 and 100 µg/ft^2, respectively. The lead hazard standards help property owners, lead paint professionals, and government agencies identify lead hazards in residential paint, dust and soil. On June 19, 2020 EPA released a proposal to lower the clearance levels for lead in dust on floors and windowsills after lead removal activities from 40 µg/ft^2 to 10 µg/ft^2 for floor dust and from 250 µg/ft^2 to 100 µg/ft^2 for windowsill dust (85 FR 37810). The dust lead clearance levels are used to demonstrate that abatement activities effectively and permanently eliminate those hazards. They apply in most pre-1978 housing and child-occupied facilities. The proposed, tighter standards would increase the effectiveness of abatement in pre-1978 homes and child care facilities.

To address lead in soil, EPA will continue to remove, remediate, and take corrective actions at contaminated sites, including Superfund, Resource Conservation and Recovery Act (RCRA) Corrective Action, and other cleanup sites. EPA will also continue to work with state and tribal air agencies to help nonattainment areas meet the National Ambient Air Quality Standards. EPA is also focused on conducting critical research and improving public awareness by consolidating and streamlining Federal messaging.

Lead and copper enter drinking water mainly from the corrosion of plumbing materials containing lead and copper. Lead was widely used in plumbing materials until Congress prohibited the use or introduction into commerce of pipes and pipe fittings and fixtures that contained more than eight percent lead and solder or flux that contained more than 0.2 percent lead in 1986. On September 1, 2020, EPA published the final rule: Use of Lead Free Pipes, Fittings, Fixtures, Solder, and Flux for Drinking Water. The Lead-Free final rule significantly limits the lead content allowed in plumbing materials (*e.g.,* pipes, fittings, and fixtures) used in new construction and replacement of existing plumbing. Specifically, the Lead-Free rule reduces the percentage of lead content allowed in these materials from eight percent to 0.25 percent in accordance with the 2011 Reduction of Lead in Drinking Water Act.

Many buildings were constructed prior to the restrictions on the use of plumbing materials that contained lead. There are currently an estimated 6.3 to 9.3 million homes served by lead service lines (LSLs) in thousands of communities nationwide, in addition to millions of older buildings with lead solder and faucets that contain lead. To reduce exposure to lead through drinking water, the Action Plan highlights several key actions, including EPA's commitment to making regulatory changes to implement the statutory definition of lead-free plumbing products and assisting schools and child care centers with the 3Ts approach (Training, Testing, and Taking Action) for lead in drinking water. The Action Plan also highlights EPA's support to states and communities by identifying funding opportunities through the Drinking Water State Revolving Fund and the Water Infrastructure Finance and Innovation Act loan program for updating and replacing drinking water infrastructure. In addition, the Action Plan highlights three newly authorized grant programs under the Water Infrastructure Improvements for the Nation (WIIN) Act, for which Congress appropriated $50 million in fiscal year (FY) 2018, to fund grants to small and disadvantaged communities for developing and maintaining infrastructure, for lead reduction projects, and to support the voluntary testing of drinking water in schools and child care centers. The Action Plan also highlights the importance of preventing lead exposure from drinking water by working with states, tribes, and local

stakeholders to share best practices and tools to better implement the NPDWR for Lead and Copper. For more information about the Federal Lead Action Plan see *https://www.epa.gov/sites/production/files/2018-12/documents/fedactionplan_lead_final.pdf.*

Since the implementation of the Lead and Copper Rule (LCR), drinking water exposures have declined significantly, resulting in major improvements in public health. For example, the number of the nation's large drinking water systems that have exceeded the LCR action level of 15 parts per billion has decreased by over 90 percent. Between 2017 and 2019, fewer than 5 percent of all water systems reported an action level exceedance (EPA–815–F–19–007). Despite this progress, there is a compelling need to modernize and improve the rule by strengthening its public health protections and clarifying its implementation requirements to make it more effective and more readily enforceable.

The LCR is a complicated rule due, in part, to the need to control corrosivity of drinking water as it travels through often antiquated distribution and plumbing systems on the way to the consumer's tap. States and public water systems need expertise and resources to identify the sampling locations and to work with customers to collect samples for analysis. Even greater expertise is needed for systems and states to identify the optimal corrosion control treatment and water quality parameter monitoring to assure that lead and copper levels are reduced to the extent feasible. The determination of the optimal corrosion control treatment is specific to each water system because it is based on the specific chemistry of the system's source water, and must be designed and implemented to take into account treatments used to comply with other applicable drinking water standards (56 FR 26487).

Water systems cannot unilaterally implement all of the actions that are needed to reduce levels of lead in drinking water. Homeowners must also be engaged to assure successful LSL replacement because, in most communities, a portion of the LSL is owned by the water system and the remaining portion is the property of the homeowner. Water systems must also engage with consumers to encourage actions such as flushing of taps before use to reduce their exposure to lead in drinking water, where necessary. The ability of water systems to successfully engage with consumers is critical to reducing drinking water lead exposure.

EPA sought input over an extended period on ways in which the Agency could address the challenges to further reducing drinking water lead exposure. Section VII of this preamble describes the engagements the Agency has had with small water systems, state and local officials, the Science Advisory Board, and the National Drinking Water Advisory Council (NDWAC). The Science Advisory Board provided recommendations in 2012 (SAB, 2012) and provided recommendations on the proposed Lead and Copper Rule revisions (LCRR) in 2020 (SAB, 2020). The NDWAC also provided recommendations on potential LCR revisions to EPA. The NDWAC provided written recommendations in December 2015 (NDWAC, 2015) and provided input to the Agency as part of consultation on the proposed LCRR in December 2019.

This final rule includes a suite of actions to address lead contamination in drinking water that, taken together, will improve the LCR and further reduce lead exposure from the previous LCR, resulting in an enduring positive public health impact. This approach focuses on six key areas:

a. *Identifying areas most impacted.* To help identify areas with the greatest potential for lead contamination of drinking water and most in need of remediation, EPA's final rule requires that all water systems complete and maintain a LSL inventory and collect tap samples from homes with LSLs if lead is present in the distribution system. To reduce elevated levels of lead in certain locations, EPA's final rule also requires water systems to engage in a ''find-and-fix'' process to identify the causes of these elevated levels as well as take potential actions to reduce lead levels.

b. *Strengthening treatment requirements.* EPA is finalizing expanded requirements for corrosion control treatment (CCT) based on tap sampling results. The final rule also establishes a new trigger level of 10 µg/L. At this trigger level, systems that currently treat for corrosion are required to re-optimize their existing treatment. Systems that do not currently treat for corrosion will be required to conduct a corrosion control study so that the system is prepared to respond quickly if necessary. Flexibility is important for small systems so that they can protect public health by taking the treatment actions that make sense for their communities. The LCRR provides new alternatives to CCT for small systems including Point-of-Use (POU) treatment and replacement of lead bearing plumbing materials.

c. *Systematically replacing lead service lines.* The final LCRR requires water systems with high lead levels to initiate LSL removal, permanently reducing a significant source of lead in many communities. All water systems with LSLs or lead status unknown service lines must create an LSLR plan by the rule compliance date. The more stringent sampling requirements in the final rule will better identify elevated lead levels, which will result in more systems replacing LSLs. Systems that are above the trigger level but at or below the lead action level must conduct replacements at a goal rate approved by the state, and, systems that are above the action level, must annually replace a minimum of three percent per year, based upon a 2 year rolling average of the number of known or potential LSLs in the inventory at the time the action level exceedance occurs. Systems cannot end their replacement program until they demonstrate lead levels less than the action level for two years. Only full LSL replacements will be counted towards the required rate, not partials and not ''in lieu of'' samples. The final rule requires water systems to provide awareness to homes with LSLs annually, and replace the water system-owned portion of an LSL when a customer chooses to replace their customer-owned portion of the line within 45 days with the ability to have up to 180 days with notification to the state.

d. *Increasing sampling reliability.* EPA is changing the criteria for selecting homes at which to collect tap samples and the way in which those samples are collected. EPA is requiring tap sample site selection to focus on sites with LSLs (where present) and is requiring a new way to collect tap samples at these sites. Systems must collect fifth liter samples that are representative of water that has been in the LSL for several hours, which will provide better information on the highest concentration of lead in drinking water. The final LCR revisions prohibit tap sampling instructions that call for pre-stagnation flushing or, the cleaning or removing of faucet aerators, and include a requirement that tap samples be collected in bottles with a wide-mouth configuration. Collectively, these new, more stringent sampling requirements will better identify elevated lead levels and result in more water systems taking required lead mitigation actions.

e. *Improving risk communication.* EPA is requiring systems to notify consumers of a system-wide action level exceedance within 24 hours. For individual tap samples that exceed 15 µg/L, EPA is requiring systems to notify

the individual consumer within three days. EPA is also requiring the consistent use of clear and concise language in public notifications and all public education materials including the LCR Public Education (PE) and Consumer Confidence Report (CCR) on the health effects of exposure to lead in drinking water. The final rule increases the number, forms, and comprehensiveness of public education materials on lead in drinking water that are provided to the public. It also requires systems to conduct regular outreach to customers with LSLs. Systems must make their LSL inventory publicly available and must notify occupants of homes with LSL every year about their LSL, drinking water exposure risks, and mitigation options, including removal. The final rule's requirements to provide understandable and consistent information about the levels of lead in drinking water, the sources of lead in a system, and the risks of lead in drinking water, will increase public actions to limit exposure to lead in drinking water.

f. *Protecting children in schools.* Since children are at most risk of significant harm from lead exposure, EPA is requiring that community water systems (CWS) test for lead in drinking water in schools and child care facilities. Systems must conduct drinking water sampling at each elementary school and each child care facility they serve over no more than five years, testing 20 percent of the facilities they serve each year. The system will be required to provide sampling results to the school or child care facility and information on actions that can be taken by the school or child care facility to reduce lead in the drinking water. The system will also be required to provide information to the school or child care facility on methods to communicate results to users of the facility and parents. CWSs are also required to provide testing to secondary schools on request during the 5 years of mandatory elementary and child care facility testing, and also to elementary schools and child care facilities on request after the first round of mandatory testing. These requirements will provide schools and child care facilities with an understanding of how to create and manage a drinking water testing program that is customizable to their needs and an appreciation of the benefits of such a program.

Through strengthened treatment procedures, expanded sampling, and improved protocols for identifying lead in drinking water, EPA's LCR revisions will require more water systems to progressively take more actions to reduce lead levels at the tap. Additionally, by improving transparency and communication, the rule is expected to increase community awareness and accelerate the replacement of LSLs. By taking these collective actions EPA, states, and water systems will implement a proactive, holistic approach to more aggressively manage lead in drinking water.

A. What are EPA's final revisions?

EPA is promulgating revisions to the LCR that strengthen public health protection and improve implementation of the regulation in the following areas: Lead tap sampling; CCT; LSLR; consumer awareness; and public education (PE). This final rule adopts a regulatory framework recommended, in part, by state co-regulators through the Association of State Drinking Water Administrators (ASDWA) and incorporates many recommendations provided to EPA by the National Drinking Water Advisory Council (NDWAC). NDWAC is a Federal Advisory Committee established pursuant to section 1446 of the Safe Drinking Water Act (SDWA) that provides EPA with advice and recommendations related to the national drinking water program. EPA is finalizing revisions to the LCR that will require water systems to take actions at lower lead tap water levels than previously required; this will reduce lead in drinking water and better protect public health. The Agency is establishing a new lead ''trigger level'' of 10 µg/L in addition to the 15 µg/L lead action level. Public health improvements will be achieved as water systems are required to take a progressive set of actions to reduce lead levels at the tap. These actions are designed to reduce lead and copper exposure by ensuring effective CCT and re-optimization of CCT when the lead trigger level or action level is exceeded; enhancing water quality parameter (WQP) monitoring; establish a ''find-and-fix'' process to evaluate and remediate elevated lead at a site where the individual tap sample exceeds 15 µg/L; require water systems to create an LSL inventory to identify the full extent of LSLs in the system; ensure tap sampling pools are targeted to the sites with elevated lead; and make consumers aware of the presence of a LSL, if applicable, to facilitate replacement of LSLs. The LCR revisions will improve tap sampling by improving the tap sampling protocol, taking samples that are more representative of the highest levels of lead in drinking water taps and better targeting higher risk sites for lead contamination, *i.e.,* sites with LSLs or lead containing plumbing materials. EPA's revisions to the LCR Public Education (PE) and Consumer Confidence Report (CCR) requirements will improve communication with consumers. In addition, this final rule includes requirements for CWSs to conduct lead in drinking water testing and PE in schools and child care facilities.

Together, these revisions to the existing framework and new requirements will result in greater public health protection at all sizes of CWSs and non-transient non-community water systems (NTNCWSs). Implementation of the revisions will better identify when and where lead contamination occurs, or has the potential to occur, and require systems to take actions to address it more effectively and sooner than under the previous rule.

The following table compares the major differences between the previous Lead and Copper Rule (LCR) (promulgated in 1991 and last revised in 2007), the 2019 proposed Lead and Copper Rule revisions (LCRR), and the final rule requirements. In general, requirements that are unchanged are not listed.

Previous LCR	Proposed LCRR	Final LCRR
Action Level (AL) and Trigger Level (TL)		
○ 90th percentile (P90) level above lead AL of 15 µg/L or copper AL of 1.3 mg/L requires additional actions.	○ 90th percentile (P90) level above lead AL of 15 µg/L or copper AL of 1.3 mg/L requires more actions than the current rule. ○ Defines lead trigger level (TL) of 10 <P90> ≤15 µg/L that triggers additional planning, monitoring, and treatment requirements.	○ 90th percentile (P90) level above lead AL of 15 µg/L or copper AL of 1.3 mg/L requires more actions than the previous rule. ○ Defines lead trigger level (TL) of 10 <P90 ≤15 µg/L that triggers additional planning, monitoring, and treatment requirements.

Previous LCR	Proposed LCRR	Final LCRR
Lead and Copper Tap Monitoring		
Sample Site Selection: ○ Prioritizes collection of samples from sites with sources of lead in contact with drinking water. ○ Highest priority given to sites served by copper pipes with lead solder installed after 1982 but before the state ban on lead pipes and/or LSLs. ○ Systems must collect 50% of samples from LSLs, if available.	*Sample Site Selection:* ○ Changes priorities for collection of samples with a greater focus on LSLs. ○ Prioritizes collecting samples from sites served by LSLs –all samples must be collected from sites served by LSLs, if available. ○ No distinction in prioritization of copper pipes with lead solder by installation date.	*Sample Site Selection:* ○ Changes priorities for collection of samples with a greater focus on LSLs. ○ Prioritizes collecting samples from sites served by LSLs –all samples must be collected from sites served by LSLs, if available. ○ No distinction in prioritization of copper pipes with lead solder by installation date. ○ Improved tap sample site selection tiering criteria.
Collection Procedure: ○ Requires collection of the first liter sample after water has sat stagnant for a minimum of 6 hours.	*Collection Procedure:* ○ Adds requirement that samples must be collected in wide-mouth bottles. ○ Prohibits sampling instructions that include recommendations for aerator cleaning/removal and pre-stagnation flushing prior to sample collection.	*Collection Procedure:* ○ Requires collection of the fifth-liter sample in homes with LSLs after water has sat stagnant for a minimum of 6 hours and maintains first-liter sampling protocol in homes without LSLs. ○ Adds requirement that samples must be collected in wide-mouth bottles. ○ Prohibits sampling instructions that include recommendations for aerator cleaning/removal and pre-stagnation flushing prior to sample collection.
Monitoring Frequency: ○ Samples are analyzed for both lead and copper. ○ Systems must collect standard number of samples, based on population; semi-annually unless they qualify for reduced monitoring. ○ Systems can qualify for annual or triennial monitoring at reduced number of sites. Schedule based on number of consecutive years meeting the following criteria: ○ Serves ≤50,000 people and ≤ lead & copper ALs. ○ Serves any population size, meets state-specified optimal water quality parameters (OWQPs), and ≤ lead AL. ○ Triennial monitoring also applies to any system with lead and copper 90th percentile levels ≤0.005 mg/L and ≤0.65 mg/L, respectively, for 2 consecutive 6-month monitoring periods. ○ 9-year monitoring waiver available to systems serving ≤3,300.	*Monitoring Frequency:* ○ Some samples may be analyzed for lead only when lead monitoring is conducted more frequently than copper. ○ Copper follows the same criteria as the current rule. ○ Lead monitoring schedule is based on P90 level for all systems as follows: ○ *P90 >15 μg/L:* Semi-annually at the standard number of sites. ○ *P90 >10 to 15 μg/L:* Annually at the standard number of sites. ○ *P90 ≤10 μg/L:* ▪ Annually and triennially at reduced number of sites using same criteria as current rule except for large systems and the copper 90th percentile level is not considered. ▪ Every 9 years based on current rule requirements for a 9-year monitoring waiver.	*Monitoring Frequency:* ○ Some samples may be analyzed for only lead when lead monitoring is conducted more frequently than copper. ○ Copper follows the same criteria as the current rule. ○ Lead monitoring schedule is based on P90 level for all systems as follows: ○ *P90 >15 μg/L:* Semi-annually at the standard number of sites. ○ *P90 >10 to 15 μg/L:* Annually at the standard number of sites. ○ *P90 ≤10 μg/L:* ▪ Annually at the standard number of sites and triennially at reduced number of sites using same criteria as previous rule except copper 90th percentile level is not considered. ▪ Every 9 years based on current rule requirements for a 9-year monitoring waiver.
Corrosion Control Treatment (CCT) and Water Quality Parameters (WQPs)		
CCT: ○ Systems serving >50,000 people were required to install treatment by January 1, 1997 with limited exception. ○ Systems serving ≤50,000 that exceed lead and/or copper AL are subject to CCT requirements (*e.g.,* CCT recommendation, study if required by primacy agency, CCT installation). They can discontinue CCT steps if no longer exceed both ALs for two consecutive 6-month monitoring periods. ○ Systems must operate CCT to meet any primacy agency-designated OWQPs that define optimal CCT. ○ There is no requirement for systems to re-optimize. *CCT Options:* Includes alkalinity and pH adjustment, calcium hardness adjustment, and phosphate or silicate-based corrosion inhibitor. *Regulated WQPs:* ○ *No CCT:* pH, alkalinity, calcium, conductivity, temperature, orthophosphate (if phosphate-based inhibitor is used), silica (if silica-based inhibitor is used). ○ *With CCT:* pH, alkalinity, and based on type of CCT either orthophosphate, silica, or calcium.	*CCT:* ○ Specifies CCT requirements for systems with 10 <P90 level ≤15 μg/L: ○ *No CCT:* must conduct a CCT study if required by primacy agency. ○ *With CCT:* must follow the steps for re-optimizing CCT, as specified in the rule. ○ Systems with P90 level >15 μg/L: ○ *No CCT:* must complete CCT installation regardless of their subsequent P90 levels. ○ *With CCT:* must re-optimize CCT. ○ CWSs serving ≤10,000 people and non-transient water systems (NTNCWSs) can select an option other than CCT to address lead. *See Small System Flexibility.* *CCT Options:* Removes calcium hardness as an option and specifies any phosphate inhibitor must be orthophosphate. *Regulated WQPs:* ○ Eliminates WQPs related to calcium hardness (*i.e.,* calcium, conductivity, and temperature).	*CCT:* ○ Specifies CCT requirements for systems with 10 <P90 level ≤15 μg/L: ○ *No CCT:* must conduct a CCT study if required by primacy agency. ○ *With CCT:* must follow the steps for re-optimizing CCT, as specified in the rule. ○ Systems with P90 level >15 μg/L: ○ *No CCT:* must complete CCT installation regardless of their subsequent P90 levels. ○ *With CCT:* must re-optimize CCT. ○ CWSs serving ≤10,000 people and non-transient water systems (NTNCWSs) can select an option other than CCT to address lead. *See Small System Flexibility.* *CCT Options:* Removes calcium hardness as an option and specifies any phosphate inhibitor must be orthophosphate. *Regulated WQPs:* ○ Eliminates WQPs related to calcium hardness (*i.e.,* calcium, conductivity, and temperature).

Previous LCR	Proposed LCRR	Final LCRR
WQP Monitoring: ○ Systems serving ≥50,000 people must conduct regular WQP monitoring at entry points and within the distribution system. ○ Systems serving ≤50,000 people conduct monitoring only in those periods > lead or copper AL. ○ Contains provisions to sample at reduced number of sites in distribution system less frequency for all systems meeting their OWQPs. *Sanitary Survey Review:* ○ Treatment must be reviewed during sanitary surveys; no specific requirement to assess CCT or WQPs. *Find-and-Fix:* No required follow-up samples or additional actions if an individual sample exceeds 15 μg/L.	*WQP Monitoring:* ○ Systems serving ≥50,000 people must conduct regular WQP monitoring at entry points and within the distribution system. ○ Systems serving ≤50,000 people must continue WQP monitoring until they no longer > lead and/or copper AL for two consecutive 6-month monitoring periods. ○ To qualify for reduced WQP distribution monitoring, P90 must be ≤10 μg/L and the system must meet its OWQPs. *Sanitary Survey Review:* ○ CCT and WQP data must be reviewed during sanitary surveys against most recent CCT guidance issued by EPA. *Find-and-Fix:* If individual tap sample >15 μg/L, systems must: ○ Collect a follow-up sample at each location >15 μg/L. ○ Conduct WQP monitoring at or near the site >15 μg/L. ○ Perform needed corrective action.	*WQP Monitoring:* ○ Systems serving ≥50,000 people must conduct regular WQP monitoring at entry points and within the distribution system. ○ Systems serving ≤50,000 people must continue WQP monitoring until they no longer > lead and/or copper AL for two consecutive 6-month monitoring periods. ○ To qualify for reduced WQP distribution monitoring, P90 must be ≤10 μg/L and the system must meet its OWQPs. *Sanitary Survey Review:* ○ CCT and WQP data must be reviewed during sanitary surveys against most recent CCT guidance issued by EPA. *Find-and-Fix:* If individual tap samples >15 μg/L. ○ Find-and-fix steps: ○ Collect tap sample at the same tap sample site within 30 days. ○ For LSL, collect any liter or sample volume. ○ If LSL is not present, collect 1 liter first draw after stagnation. ○ For systems with CCT. ○ Conduct WQP monitoring at or near the site >15 μg/L. ○ Perform needed corrective action. ○ Document customer refusal or non-response after 2 attempts. ○ Provide information to local public health officials.
LSL Inventory and LSLR Plan		
Initial LSL Program Activities: ○ Systems were required to complete a materials evaluation by the time of initial sampling. No requirement to update materials evaluation. ○ No LSLR plan is required.	*Initial LSL Program Activities:* ○ All systems must develop an LSL inventory or demonstrate absence of LSLs within first 3 years of final rule publication. ○ LSL inventory must be updated annually. ○ All systems with known or possible LSLs must develop an LSLR plan.	*Initial LSL Program Activities:* ○ All systems must develop an LSL inventory or demonstrate absence of LSLs within 3 years of final rule publication. ○ LSL inventory must be updated annually or triennially, based on their tap sampling frequency. ○ All systems with known or possible LSLs must develop an LSLR plan.
LSLR: ○ Systems with LSLs with P90 >15 μg/L after CCT installation must annually replace ≥7% of number of LSLs in their distribution system when the lead action level is first exceeded. ○ Systems must replace the LSL portion they own and offer to replace the private portion at the owner's expense. ○ Full LSLR, partial LSLR, and LSLs with lead sample results ≤15 μg/L (''test-outs'') count toward the 7% replacement rate. ○ Systems can discontinue LSLR after 2 consecutive 6-month monitoring periods ≤ lead AL.	*LSLR:* ○ Rule specifies replacement programs based on P90 level for CWSs serving >10,000 people: ○ If P90 >15 μg/L: Must fully replace 3% of LSLs per year (mandatory replacement) for 4 consecutive 6-month monitoring periods. ○ If P90 >10 to 15 μg/L: Implement an LSLR program with replacement goals in consultation with the primacy agency for 2 consecutive 1-year monitoring periods. ○ Small CWSs and NTNCWSs that select LSLR as their compliance option must complete LSLR within 15 years if P90 >15 μg/L *See Small System Flexibility.* ○ Annual LSLR rate is based on number of LSLs when the system first exceeds the action level plus the current number of lead status unknown service lines. ○ Only full LSLR (both customer-owned and system-owned portion) count toward mandatory rate or goal-based rate.	*LSLR:* ○ Rule specifies replacement programs based on P90 level for CWSs serving >3,300 people: ○ If P90 >15 μg/L: Must fully replace 3% of LSLs per year based upon a 2 year rolling average (mandatory replacement) for at least 4 consecutive 6-month monitoring periods. ○ If P90 >10 to 15 μg/L: Implement an LSLR program with replacement goals in consultation with the primacy agency for 2 consecutive 1-year monitoring periods. ○ Small CWSs and NTNCWSs that select LSLR as their compliance option must complete LSLR within 15 years if P90 >15 μg/L *See Small System Flexibility.* ○ Annual LSLR rate is based on number of LSLs and galvanized requiring replacement when the system first exceeds the action level plus the current number of lead status unknown service lines. ○ Only full LSLR (both customer-owned and system-owned portion) count toward mandatory rate or goal-based rate.

Previous LCR	Proposed LCRR	Final LCRR
	○ All systems must replace their portion of an LSL if notified by consumer of private side replacement within 45 days of notification of the private replacement. ○ Following each LSLR, systems must: ○ Provide pitcher filters/cartridges to each customer for 3 months after replacement. Must be provided within 24 hours for full and partial LSLRs. ○ Collect a lead tap sample at locations served by replaced line within 3 to 6 months after replacement. ○ Requires replacement of galvanized service lines that are or ever were downstream of an LSL.	○ All systems replace their portion of an LSL if notified by consumer of private side replacement within 45 days of notification of the private replacement. If the system cannot replace the system's portion within 45 days, it must notify the state and replace the system's portion within 180 days. ○ Following each LSLR, systems must: ○ Provide pitcher filters/cartridges to each customer for 6 months after replacement. Provide pitcher filters/cartridges within 24 hours for full and partial LSLRs. ○ Collect a lead tap sample at locations served by replaced line within 3 to 6 months after replacement. ○ Requires replacement of galvanized service lines that are or ever were downstream of an LSL.
LSL-Related Outreach: ○ When water system plans to replace the portion it owns, it must offer to replace customer-owned portion at owner's expense. ○ If system replaces its portion only: ○ Provide notification to affected residences within 45 days prior to replacement on possible elevated short-term lead levels and measures to minimize exposure. ○ Include offer to collect lead tap sample within 72 hours of replacement. ○ Provide test results within 3 business days after receiving results.	*LSL-Related Outreach:* ○ Inform consumers annually that they are served by LSL or service line of unknown lead status. ○ Systems subject to goal-based program must: ○ Conduct targeted outreach that encourages consumers with LSLs to participate in the LSLR program. ○ Conduct an additional outreach activity if they fail to meet their goal. ○ Systems subject to mandatory LSLR include information on LSLR program in public education (PE) materials that are provided in response to P90 > AL.	*LSL-Related Outreach:* ○ Inform consumers annually that they are served by LSL or lead status unknown service line. ○ Systems subject to goal-based program must: ○ Conduct targeted outreach that encourages consumers with LSLs to participate in the LSLR program. ○ Conduct an additional outreach activity if they fail to meet their goal. ○ Systems subject to mandatory LSLR include information on LSLR program in public education (PE) materials that are provided in response to P90 > AL.
Small System Flexibility		
No provisions for systems to elect an alternative treatment approach but sets specific requirements for CCT and LSLR.	Allows CWSs serving ≤10,000 people and all NTNCWSs with P90 >10 μg/L to elect their approach to address lead with primacy agency approval: ○ Systems can choose CCT, LSLR, or provision and maintenance of point-of-use devices. ○ NTNCWSs can also elect to replace all lead-bearing materials.	Allows CWSs serving ≤10,000 people and all NTNCWSs with P90 >10 μg/L to select their approach to address lead with primacy agency approval: ○ Systems can choose CCT, LSLR, provision and maintenance of point-of-use devices; or replace all lead-bearing plumbing materials.
Public Education and Outreach		
○ All CWSs must provide education material in the annual Consumer Confidence Report (CCR). ○ Systems with P90 >AL must provide PE to customers about lead sources, health effects, measures to reduce lead exposure, and additional information sources. ○ Systems must provide lead consumer notice to individuals served at tested taps within 30 days of learning results. ○ Customers can contact the CWS to get PE materials translated in other languages.	○ CWSs must provide updated health effects language in all PE materials and the CCR. ○ If P90 > AL: ○ Current PE requirements apply. ○ Systems must notify consumers of P90 > AL within 24 hours. ○ In addition, CWSs must: ○ Improve public access to lead information including LSL locations and respond to requests for LSL information. ○ Deliver notice and educational materials to consumers during water-related work that could disturb LSLs. ○ Provide increased information to local and state health agencies. ○ Provide lead consumer notice to consumers whose individual tap sample is >15 μg/L within 24 hours. ○ *Also see LSL-Related Outreach in LSLR section of table.*	○ CWSs must provide updated health effects language in all PE materials and the CCR. ○ Customers can contact the CWS to get PE materials translated in other languages. ○ All CWSs are required to include information on how to access the LSL inventory and how to access the results of all tap sampling in the CCR. ○ Revises the mandatory health effects language to improve accuracy and clarity. ○ If P90 > AL: ○ Current PE requirements apply. ○ Systems must notify consumers of P90 > AL within 24 hours. ○ In addition, CWSs must: ○ Deliver notice and educational materials to consumers during water-related work that could disturb LSLs. ○ Provide information to local and state health agencies. ○ Provide lead consumer notice to consumers whose individual tap sample is >15 μg/L as soon as practicable but no later than 3 days. *Also see LSL-Related Outreach section of table.*
Change in Source or Treatment		
Systems on a *reduced* tap monitoring schedule must obtain prior primacy agency approval before changing their source or treatment.	Systems on *any* tap monitoring schedule must obtain prior primacy agency approval before changing their source or treatment.	Systems on *any* tap monitoring schedule must obtain prior primacy agency approval before changing their source or treatment. These systems must also conduct tap monitoring biannually.

Previous LCR	Proposed LCRR	Final LCRR
Source Water Monitoring and Treatment		
○ Periodic source water monitoring is required for systems with: ○ Source water treatment; or ○ P90 > AL and no source water treatment.	○ Primacy Agencies can waive continued source water monitoring if the: ○ System has already conducted source water monitoring for a previous P90 > AL; ○ primacy agency has determined that source water treatment is not required; *and* ○ System has not added any new water sources.	○ Primacy Agencies can waive continued source water monitoring if the: ○ System has already conducted source water monitoring for a previous P90 > AL; ○ primacy agency has determined that source water treatment is not required; *and* ○ System has not added any new water sources.
Lead in Drinking Water at Schools and Child Care Facilities		
○ Does not include separate testing and education program for CWSs at schools and child care facilities. ○ Schools and child cares that are classified as NTNCWSs must sample for lead and copper.	○ CWSs must conduct lead in drinking water testing and PE at 20% of K–12 schools and licensed child cares in service area every 5 years. ○ Sample results and PE must be provided to each sampled school/child care, primacy agency and local or state health department. ○ Excludes facilities built after January 1, 2014.	○ CWS must conduct sampling at 20% of elementary schools and 20% of child care facilities per year and conduct sampling at secondary schools on request for 1 testing cycle (5 years) and conduct sampling on request of all schools and child care facilities thereafter. ○ Sample results and PE must be provided to each sampled school/child care, primacy agency and local or state health department. ○ Excludes facilities built or replaced all plumbing after January 1, 2014.
Primacy Agency Reporting		
Primacy Agencies must report information to EPA that includes but is not limited to: ○ All P90 levels for systems serving >3,300 people, and only levels >15 µg/L for smaller systems. ○ Systems that are required to initiate LSLR and the date replacement must begin. ○ Systems for which optimal corrosion control treatment (OCCT) has been designated.	Expands current requirements to include: ○ All P90 values for all system sizes. ○ The current number of LSLs and lead status unknown service lines for every water system. ○ OCCT status of all systems including primacy agency-specified OWQPs.	Expands current requirements to include: ○ All P90 values for all system sizes. ○ The current number of LSLs and lead status unknown service lines for every water system. ○ OCCT status of all systems including primacy agency-specified OWQPs.

B. Does this action apply to me?

Entities that could potentially be affected include the following:

Category	Examples of potentially affected entities
Public water systems	Community water systems (a public water system that (A) serves at least 15 service connections used by year-round residents of the area served by the system; or (B) regularly serves at least 25 year-round residents). Non-transient, non-community water systems (a public water system that is not a community water system and that regularly serves at least 25 of the same persons over 6 months per year).
State and tribal agencies	Agencies responsible for drinking water regulatory development and enforcement.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities that could be affected by this action. To determine whether your facility or activities could be affected by this action, you should carefully examine this final rule.

As part of this document for the LCRR, ''state'' refers to the agency of the state or tribal government which has jurisdiction over public water systems consistent with the definition of ''state'' in 40 CFR 141.2. During any period when a state or tribal government does not have primary enforcement responsibility pursuant to section 1413 of the SDWA, the term ''state'' means the applicable Regional Administrator of the U.S. Environmental Protection Agency. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the **FOR FURTHER INFORMATION CONTACT** section.

II. Background

A. Health Effects of Lead and Copper

Exposure to lead is known to present serious health risks to the brain and nervous system of children. Lead exposure causes damage to the brain and kidneys and can interfere with the production of red blood cells that carry oxygen to all parts of the body. Lead has acute and chronic impacts on the body. The most robustly studied and most susceptible subpopulations are the developing fetus, infants, and young children. Even low level lead exposure is of particular concern to children because their growing bodies absorb more lead than adults do, and their brains and nervous systems are more sensitive to the damaging effects of lead. EPA estimates that drinking water can make up 20 percent or more of a person's total exposure to lead. Infants who consume mostly formula mixed with tap water can, depending on the level of lead in the system and other sources of lead in the home, receive 40 percent to 60 percent of their exposure to lead from drinking water used in the formula (USEPA, 1988). Scientists have linked lead's effects on the brain with lowered intelligence quotient (IQ) and attention disorders in children (USEPA, 2013). Young children and infants are particularly vulnerable to lead because the physical and behavioral effects of lead occur at lower exposure levels in children than in adults. During

pregnancy, lead exposure may affect prenatal brain development. Lead is stored in the bones and it can be released later in life. Even at low levels of lead in blood, there is an increased risk of health effects in children (*e.g.,* less than 5 micrograms per deciliter) and adults (*e.g.,* less than 10 micrograms per deciliter) (National Toxicology Program, 2012).

The 2013 Integrated Science Assessment for Lead (USEPA, 2013) and the HHS National Toxicology Program Monograph on Health Effects of Low-Level Lead (National Toxicology Program, 2012) have both documented the association between lead and adverse cardiovascular effects, renal effects, reproductive effects, immunological effects, neurological effects, and cancer. EPA's Integrated Risk Information System (IRIS) Chemical Assessment Summary provides additional health effects information on lead (USEPA, 2004a). For a more detailed explanation of the health effects associated with lead for children and adults see Appendix D of the Economic Analysis.

Acute copper exposure causes gastrointestinal distress. Chronic exposure to copper is particularly a concern for people with Wilson's disease because they are prone to copper accumulation in body tissue, which can lead to liver damage, neurological, and/or psychiatric symptoms. For a more detailed explanation of the health effects associated with copper see Appendix E of the final rule Economic Analysis (USEPA, 2020). EPA did not propose revisions to the copper requirements; thus, the final rule does not revise the copper requirements.

B. Statutory Authority

EPA is publishing revisions to the LCR under the authority of the Safe Drinking Water Act (SDWA), including sections 1412, 1413, 1414, 1417, 1445, and 1450 of the SDWA. 42 U.S.C. 300f *et seq.*

Section 1412(b)(9) provides that ''[T]he Administrator shall, not less often than every 6 years, review and revise, as appropriate, each national primary drinking water regulation promulgated under this subchapter. Any revision of a national primary drinking water regulation shall be promulgated in accordance with this section, except that each revision shall maintain, or provide for greater, protection of the health of persons.'' 42 U.S.C. 300g–1(b)(9). In promulgating this revised NPDWR, EPA followed the applicable procedures and requirements described in section 1412 of the SDWA, including those related to (1) the use of the best available, peer-reviewed science and supporting studies; (2) presentation of information on public health effects; and (3) a health risk reduction and cost analysis of the rule in 1412(b)((3)(A), (B), (C) of the SDWA, 42 U.S.C. 300g–1(b)(3)(A)–(C).

This rule revises the Lead and Copper Rule which established treatment technique requirements instead of a maximum contaminant level. Section 1412(b)(7)(A) of the SDWA authorizes EPA to ''promulgate a national primary drinking water regulation that requires the use of a treatment technique in lieu of establishing a maximum contaminant level, if the Administrator makes a finding that it is not economically or technologically feasible to ascertain the level of the contaminant.'' EPA's decision to promulgate a treatment technique rule for lead instead of a maximum contaminant level (MCL) in 1991 has been upheld by the United States Court of Appeals for the District of Columbia Circuit. *American Water Works Association* v. *EPA,* 40 F.3d 1266, 1270–71 (D.C. Cir. 1994).

In establishing treatment technique requirements, the Administrator is required to identify those treatment techniques ''which in the Administrator's judgment, would prevent known or anticipated adverse effects on the health of persons to the extent feasible.'' 42 U.S.C. 300g–1(b)(7)(A). ''Feasible'' is defined in Section 1412(b)(4)(D) of the SDWA as ''feasible with the use of the best technology, treatment techniques and other means which the Administrator finds after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking cost into consideration).'' The legislative history for this provision makes it clear that ''feasibility'' is to be defined relative to ''what may reasonably be afforded by large metropolitan or regional public water systems.'' *A Legislative History of the Safe Drinking Water Act,* Committee Print, 97th Cong., 2d Sess. (1982) at 550. See also *City of Portland* v. *EPA,* 507 F.3d 706 (D.C. Cir. 2007) (upholding EPA's treatment technique for *Cryptosporidium* and the Agency's interpretation that ''feasible'' means technically possible and affordable, rather than a cost/benefit determination). If the ''feasible'' treatment technique requirement would result in an increase in the health risk from drinking water by increasing the concentration of other contaminants in drinking water, or interfering with the efficacy of treatment techniques or processes that are used to comply with other national primary drinking water regulations, then the treatment techniques ''shall minimize the overall risk of adverse health effects by balancing the risk from the contaminant and the risk from other contaminants''; however, the resulting requirements may not be more stringent than what is ''feasible''. 42 U.S.C. 300g–1(b)(5).

Section 1414(c) of the SDWA, as amended by the WIIN Act, requires public water systems to provide notice to the public if the water system exceeds the lead action level. 42 U.S.C. 300g–3(c). The SDWA section 1414(c)(2) provides that the Administrator ''shall, by regulation . . . prescribe the manner, frequency, form, and content for giving notice'' under section 1414(c). 42 U.S.C. 300g–3(c)(2). The SDWA section 1414(c)(2)(C) specifies additional requirements for those regulations related to public notification of a lead action level exceedance ''that has the potential to have serious adverse effects on human health as a result of short-term exposure.'' The public notice must be distributed as soon as practicable, but not later than 24 hours after the water systems learns of the action level exceedance and the system must report the exceedance to both the Administrator and the primacy agency in that same time period. 42 U.S.C. 300g–3(c)(2)(C)(i) and (iii). The requirement in Section 1414(c)(2)(C)(iii) to provide notification to EPA as well as the primacy agency was enacted in 2016 as part of the WIIN Act. One purpose of this requirement is to allow EPA to implement Section 1414(c)(2)(D), which was also enacted as part of the WIIN Act. It directs EPA to issue the required public notice for an exceedance of the lead action level, not later than 24 hours after the Administrator is notified of the exceedance, if the water system or the primacy agency has not issued the required public notice. EPA may receive this information directly from water systems or states. Because the Administrator's duty under Section 1414(c)(2)(D) is triggered only in the event of an action level exceedance and not any violation of an NPDWR, EPA interprets 1414(c)(2)(C)(iii) to require systems to report only action level exceedances (ALEs) to the Administrator.

Section 1417(a)(2) of the SDWA provides that public water systems ''shall identify and provide notice to persons that may be affected by lead contamination of their drinking water where such contamination results from the lead content of the construction materials of the public water distribution system and/or corrosivity of the water supply sufficient to cause

leaching of lead. 42 U.S.C. 300g–6(a)(2)(A)(i) and (ii). The notice ''shall be provided notwithstanding the absence of a violation of any national drinking water standard.'' 42 U.S.C. 300g–6(a)(2)(A).

Section 1445(a) of the SDWA authorizes the Administrator to establish monitoring, recordkeeping, and reporting regulations, to assist the Administrator in establishing regulations under the SDWA, in determining compliance with the SDWA, and in administering any program of financial assistance under the SDWA. 42 U.S.C. 300j–4(a). In requiring a public water system to monitor under section 1445(a) of the SDWA, the Administrator may take into consideration the water system size and the contaminants likely to be found in the system's drinking water. 42 U.S.C. 300j–4(a). The SDWA section 1445(a)(1)(C) provides that ''every person who is subject to a national primary drinking water regulation'' must provide such information as the Administrator may reasonably require to assist the Administrator in establishing regulations under section 1412. 42 U.S.C 300j–4(a)(1)(C). The monitoring, recordkeeping, and reporting requirements in today's rule, including the inventory requirements, are part of the NPDWR treatment technique requirements; in addition, EPA expects to consider the information collected in any future revisions to the Lead and Copper Rule and in administering financial assistance programs (*e.g.,* grant programs for the replacement of LSLs and/or school sampling).

Under section 1413(a)(1) of the SDWA a state may exercise primary enforcement responsibility (''primacy'') for NPDWRs when EPA has determined, among other things, that the state has adopted regulations that are no less stringent than EPA's. 42 U.S.C. 300g–2(a)(1). To obtain primacy for this rule, states must adopt regulations that are at least as stringent as this rule within two years of EPA's promulgation, unless EPA grants the state a two-year extension. State primacy requires, among other things, adequate enforcement (including monitoring and inspections) and reporting requirements. EPA must approve or deny state primacy applications within 90 days of submission to EPA. 42 U.S.C. 300g–2(b)(2). In some cases, a state submitting revisions to adopt an NPDWR has interim primary enforcement authority for the new regulation while EPA's decision on the revision is pending. 42 U.S.C. 300g–2(c). Section 1413(b)(1) of the SDWA requires EPA to establish regulations governing the primacy application and review process ''with such modifications as the Administrator deems appropriate.'' In addition to the LCR revisions promulgated today which are more stringent than the previous LCR, this rule includes changes to primacy requirements related to this rule.

Section 1450 of the SDWA authorizes the Administrator to prescribe such regulations as are necessary or appropriate to carry out his or her functions under the Act. 42 U.S.C. 300j–9.

C. Regulatory History

EPA published the LCR on June 7, 1991, to control lead and copper in drinking water at the consumer's tap. The rule established a NPDWR for lead and copper consisting of treatment technique requirements that include CCT, source water treatment, lead service line replacement (LSLR), and PE. The rule established an action level of 0.015 mg/L or 15 µg/L for lead and 1.3 mg/L or 1,300 µg/L for copper. The action level is a concentration of lead or copper in the water that determines, in some cases, whether a water system must install CCT, monitor source water, replace LSLs, and undertake a PE program. The action level is exceeded if the concentration in more than 10 percent of tap samples collected during any monitoring period is greater than the action level (*i.e.,* if the 90th percentile level is greater than the action level). If the 90th percentile value for tap samples is above the action level, it is not a treatment technique violation, but rather compels actions, such as WQP monitoring, CCT, source water monitoring/treatment, PE, and LSLR. Failure to take these actions results in the water system being in violation of the treatment technique or monitoring and reporting requirements.

In 2000, EPA promulgated the Lead and Copper Rule Minor Revisions or LCRMR, which streamlined requirements, promoted consistent national implementation, and in many cases, reduced burden for water systems. One of the provisions of the LCRMR required states to report the lead 90th percentile to EPA's Safe Drinking Water Information System (SDWIS) database for all water systems serving greater than 3,300 persons. States must report the lead 90th percentile value for water systems serving 3,300 or fewer persons only if the water system exceeds the action level. The new reporting requirements became effective in 2002. In 2004, EPA published minor corrections to the LCR to reinstate text that was inadvertently dropped from the rule during the previous revision.

In 2004, EPA undertook a national review of the LCR and performed a number of activities to help identify needed actions to improve implementation of the LCR. EPA collected and analyzed lead concentration data and other information required by the LCR, carried out review of implementation by states, held four expert workshops to further discuss elements of the LCR, and worked to better understand local and state efforts to test for lead in school drinking water, including a national meeting to discuss challenges and needs. EPA used the information collected during the national review to identify needed short-term and long-term regulatory revisions to the LCR.

In 2007, EPA promulgated a set of short-term regulatory revisions and clarifications to strengthen implementation of the LCR in the areas of monitoring, treatment, customer awareness, LSLR, and improve compliance with the PE requirements to ensure drinking water consumers receive meaningful, timely, and useful information needed to help them limit their exposure to lead in drinking water. Long-term issues, requiring additional research and input, were identified for a subsequent set of rule revisions.

EPA published proposed revisions to the LCR on November 13, 2019 for public review and comment (84 FR 61684). The proposal included provisions to strengthen procedures and requirements related to health protection and the implementation of the existing LCR in the following areas: Lead tap sampling; corrosion control treatment; LSL replacement; consumer awareness; and public education. In addition, the proposal included new requirements for CWSs to conduct lead in drinking water testing and public education in schools and child care facilities.

III. Revisions to 40 CFR Part 141, Subpart I, Control of Lead and Copper

A. Lead Trigger Level

1. Proposed Revisions

EPA proposed a lead ''trigger level'' of 10 µg/L in addition to the LCR's current 15 µg/L lead action level. The trigger level is not a health based standard. EPA proposed 10 µg/L as a reasonable concentration that is below the action level and above the Practical Quantitation Level of 5 µg/L at which to require water systems to take a progressive set of actions to reduce lead levels prior to an action level exceedance and to have a plan in place

to rapidly respond if there is an action level exceedance. For large and medium water systems, EPA proposed action that included optimizing CCT, a goal based LSLR program, and annual tap sampling (no reduced monitoring). EPA proposed that small water systems would be required to designate the actions they would take if they exceed the action level.

2. Public Comment and EPA's Response

A number of commenters supported the trigger level, stating that it would be beneficial because it initiates actions by public water systems to decrease their lead levels and requires the utility to take proactive steps to remove lead from the distribution system, reducing exposure to lead from drinking water throughout the utility's community. A commenter suggested that the trigger level be lowered to 5 µg/L (the stakeholder added a reference to ''CDC'' however, the Centers for Disease Control and Prevention established a blood lead reference level of 5 µg/deciliter, that is not a drinking water level). Other commenters suggested a trigger level of 1 µg/L (recommended by the American Academy of Pediatrics (AAP, 2016)).

The use of a trigger level of 10 µg/L in the implementation of this treatment technique rule provides a reasonable concentration that is below the action level and above the Practical Quantitation Level of 5 µg/L at which to require water systems to take a progressive set of actions to reduce lead levels prior to an action level exceedance and to have a plan in place to rapidly respond if there is an action level exceedance. Requiring such actions of systems only when a trigger level 10 µg/L is exceeded, rather than all systems prioritizes actions at systems with higher lead levels and allows states to work proactively with water systems that are a higher priority. The actions water systems will be required to undertake if their 90th percentile exceeds the trigger level will require review and oversight from states to assure that they are effective in reducing drinking water lead levels. As shown in Exhibits 4–13 and 4–20 of the Economic Analysis, setting a lower trigger level would substantially increase the number of water systems required to obtain review and input from their primacy agency to comply with the CCT and LSLR requirements. EPA has concluded it is not practicable for this significant number of water systems to obtain this state review and approval.

The LCR's action level prioritizes systems with the highest lead levels for state interaction and mandates actions to reduce drinking water lead levels. Similarly, the Agency has determined that 10 µg/L is a reasonable level to trigger water systems with higher (but not the highest) lead levels to have interactions with states to prepare for and to undertake actions to reduce drinking water lead levels.

Other commenters expressed concerns about the potential for confusion caused by separate trigger level and action level requirements. One of these commenters stated that the trigger level would be another decision-criterion for the public to mis-construe as a level of health concern. EPA does not agree with these commenters. The Agency has established a health based maximum contaminant level goal (MCLG) of zero for lead. The trigger level is not a health based level, rather it is a reasonable level at which to require systems to begin to take a progressive set of actions based upon lead levels at the tap that are appropriate to assure reduced exposure to lead. The concept of including additional thresholds to compel actions before an action level exceedance was suggested by the Association of State Drinking Water Administrators as a way to focus actions towards the systems with the greatest potential concerns (USEPA, 2018). This regulatory framework is similar to other NPDWRs, such as the Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), which requires increasing levels of remedial action based on the concentration of the contaminant. EPA has revised the regulatory text in the final rule to improve its clarity and will work with primacy agencies and water systems to assure they understand the different actions that must be taken when systems exceed the trigger level or action level.

Additional commenters suggested EPA lower the action level and eliminate the trigger level, stating the trigger level makes the rule unnecessarily complicated and needlessly adds to the regulatory burden. EPA disagrees that the action level should be lowered. EPA established the lead action level in 1991 to require small and medium-sized systems exceeding it to install corrosion control treatment and to require large systems and other systems with optimal corrosion control treatment (OCCT) to conduct LSLR. The action level was based on examination of data at 39 medium sized systems; while it was ''limited as a basis for making broad-based estimates of treatment efficacy,'' EPA concluded that ''the data are useful as general indictors of the range of levels systems have achieved with various treatment measures in place.'' (56 FR 26490). EPA acknowledged in 1991 that the selection of the action level ''is not based on a precise statistical analysis of the effectiveness of treatment'' but it ''reflects EPA's assessment of a level that is generally representative of effective corrosion control treatment, and that is, therefore, useful as a tool for simplifying the implementation of the treatment technique'' at those systems. (56 FR 26490). EPA decided to use the same action level as a screen to determine which systems with CCT must also replace LSLs (56 FR 26491). While EPA is not lowering the action level, the Agency is strengthening the public health protections of the treatment technique by improving the sampling procedures to better identify elevated levels of lead. This will result in more systems exceeding the action level and more actions to reduce drinking water exposure to lead.

EPA disagrees with commenters that the trigger level results in unnecessary complexity and regulatory burden. While there is burden associated with the actions that systems must take when they exceed the trigger level, EPA determined that a progressive set of actions based upon lead levels at the tap are feasible to assure reduced exposure to lead. EPA in its Health Risk Reduction Cost Analysis (HRRCA) has found that a significant number of benefits accrue from systems being required to take mitigation activities as a result of trigger level exceedances. EPA also examined the costs and found that it is feasible for systems to take the actions required when there is a trigger level exceedance. Requiring these actions when a system's lead levels are high, but not exceeding the action level, will help both systems and states to engage in a manageable and orderly process to reduce lead levels in drinking water so that they remain below the lead action level. Accordingly, inclusion of the trigger level in the final rule will provide for ''greater protection of the health of persons'' consistent with the statutory authority in Section 1412(b)(9) of the Safe Drinking Water Act (SDWA) for revising existing drinking water standards. Additionally, this proactive approach to lead contamination in response to a trigger level will allow systems to quickly take action if there is a ALE, while reducing the likelihood that a water system will exceed the action level in the future or be faced with the need to implement emergency measures such as the distribution of water filters or bottled water in response to a lead crisis.

3. Final Revisions

EPA is finalizing the lead trigger level of 10 µg/L and maintaining the lead action level of 15 µg/L. In the event of a trigger level exceedance, the actions water systems are required to take vary based on characteristics of the system. Each of the requirements brought about by a trigger level exceedance is discussed in detail elsewhere in this document. However, in summary, small CWSs serving populations of 10,000 or fewer persons and all sizes of NTNCWS that exceed the lead trigger level, but not the lead action level, must evaluate the small system flexibilities described in Section III.E of this preamble and identify the action they will take if they exceed the action level. Medium and large CWSs that exceed the trigger level, but do not exceed the action level, must implement requirements based on their CCT and LSL status as described below.

Water systems with CCT in place and with no LSLs or service lines of unknown lead status are required to re-optimize CCT (see Section III.B); and conduct annual tap sampling (no reduced monitoring (see Section III.G)).

Water systems without CCT in place and with no LSLs or service lines of unknown lead status are required to: conduct a CCT study and obtain state approval for designated CCT (see Section III.B.); and conduct annual tap sampling (no reduced monitoring (see Section III.G)).

Water systems with CCT in place and with LSLs or service lines of unknown lead status are required to: Re-optimize CCT (see Section III.B); notify customers with LSLs or unknowns (see Section III.F); implement a goal-based LSLR program (see Section III.D); and conduct annual tap sampling (no reduced monitoring (see Section III.G)).

Water systems without CCT in place and with LSLs or service lines (*i.e.,* the pipe that connects the water main to the building) of unknown lead status are required to: Conduct a CCT study and obtain state approval for designated CCT (see Section III.B) notify customers with an LSL or unknowns (see Section III.F); implement a goal based LSLR program (see Section III.D); and conduct annual tap sampling (no reduced monitoring (see Section III.G).

B. Corrosion Control Treatment Requirements Based on Lead 90th Percentile

1. Proposed Revisions

EPA proposed revised CCT requirements based on the water system's lead 90th percentile level and CCT status. The proposed rule required all water systems with CCT that have a lead trigger level exceedance (>10 µg/L but ≤15 µg/L) or a lead action level exceedance (>15 µg/L) to re-optimize their CCT. The proposed rule would require water systems to evaluate other corrosion control treatments, make a re-optimization recommendation, and receive state approval of any changes to CCT or water quality parameters (WQPs). The state could require the water system to conduct a CCT study under the proposed rule.

The proposal required water systems without CCT that exceed the lead trigger level (10 µg/L) to conduct a CCT study *and make a CCT recommendation to the state.* Once approved by the state, the CCT recommendation would be implemented if the water system exceeds the lead action level in subsequent tap sampling. Water systems without CCT that have previously conducted a CCT study and made CCT recommendations would not be required to prepare a new CCT study if they exceed the trigger level again unless the state determines that a new study is required due to changed circumstances, such as addition of a new water source or changes in treatment or if revised CCT guidance has been issued by EPA since the study was conducted. Under the proposed rule the state could also determine that a new CCT study is needed due to other significant information becoming available.

EPA proposed changes to the CCT options that water systems must consider and the methods by which water systems would evaluate those options. EPA proposed removing calcium carbonate stabilization as a CCT option. EPA also proposed requiring water systems to evaluate two additional options for orthophosphate-based corrosion control: Maintaining a 1 mg/L orthophosphate residual concentration and maintaining a 3 mg/L orthophosphate residual concentration.

EPA also proposed changes to the methodologies by which systems evaluate CCT options. EPA proposed that metal coupon tests could only be used as a screen to reduce the number of options that are evaluated using pipe rig/loops and would no longer be able to be used as the basis for determining the OCCT.

EPA proposed that when systems choose to conduct coupon studies to screen potential options and/or pipe rig/loop studies, these systems cannot exclude a treatment option from the study based upon potential effects on other water quality treatment processes. Systems that are conducting coupon screening studies and/or pipe loop/rig studies should identify potential constraints, such as the impact that CCT options or treatment chemicals may have on other water quality treatment processes. Those impacts should be noted and considered as part of the CCT study design.

EPA proposed that a medium or small water system that exceeds the lead action level (15 µg/L), that has previously not exceeded the lead trigger level and does not have CCT installed, would be required to conduct a CCT study, make a treatment recommendation, and obtain state approval of the OCCT determination. EPA proposed that systems be required to complete these steps even if the system meets the lead action level in two subsequent, consecutive 6-month monitoring periods over the course of this process. Water systems that meet the action level for two consecutive 6-month monitoring periods before installing the state-approved treatment would be required to install that CCT upon any subsequent action level exceedance. EPA proposed to retain the current LCR provision that allows a state to waive the requirement for a CCT study.

2. Public Comment and EPA's Response

Commenters generally supported the evaluation or re-evaluation of corrosion control treatment based on a trigger level or action level exceedance because it would increase public health protection by prioritizing systems with the highest 90th percentiles. Many commenters had objections to the proposed re-optimization process. Some commented that the re-optimization process was too prescriptive, and that more flexibility was needed. Commenters wrote that the steps needed to optimize or reoptimize treatment varied based on factors including the presence/absence of LSLs, system size, 90th percentile lead concentration, and existing corrosion control treatment. Several commenters suggested a toolbox or ''bin approach'' that allows consideration of these factors by systems and states to determine which optimization/re-optimization process or ''bin'' is most appropriate. For example, water systems with LSLs and OCCT would be in a different ''bin'' than water systems with LSLs and no OCCT. Many commenters suggested that systems be allowed to modify the existing corrosion control treatment before considering alternate treatments. Commenters stated that the proposed re-optimization process might limit a system's ability to quickly and efficiently reduce lead levels. EPA agrees that optimization and re-optimization processes should

provide more flexibility. EPA agrees that for some systems, lead reductions can be achieved quickly with slight modifications of the existing CCT and should not be delayed potentially by two years for the results of the corrosion control study. EPA agrees it is appropriate for states to approve modifications of the system's existing CCT for the ''bin'' of systems that are between the trigger level and action level without a corrosion control study.

EPA agrees that the process to optimize/reoptimize CCT should be determined based on system characteristics such as system size, the presence of LSLs and 90th percentile value. EPA agrees that a ''bin approach'' in which the steps of the optimization/re-optimization process depend upon system characteristics can provide flexibility for some systems to more effectively establish optimal CCT. EPA agrees that requirements to conduct harvested pipe loop studies and coupon studies are best delineated through such a bin approach. Harvested pipe loop studies are only required for systems with LSLs that exceed the lead action level. To the extent that there are any large systems without corrosion control treatment that have LSLs and exceed the lead practical quantitation level of 0.005 mg/L, those systems would also need to conduct a harvested pipe loop study. EPA believes that the CCT changes needed for systems of any size above the action level merit a thorough investigation of the impacts of the options on the existing LSL pipe scale. Commenters noted that some small systems may not have the technical capacity to construct and operate a harvested pipe loop study. EPA notes that in these cases the final rule provides flexibility to these small systems to implement a LSLR program or POU program. Coupon studies can serve as a screen to reduce the number of options for the harvested pipe loop study. Commenters noted that the construction of harvested flow-through pipe loops and the stabilization of those loops can take six months to one year before options can be evaluated. EPA agrees that more time is needed to construct pipe loops from harvested pipes and therefore is removing the requirement for initial treatment recommendations in the final rule for large and medium systems. For these systems, the final rule directs them to start constructing and operating the flow-through pipe loops after the action level exceedance in place of the initial treatment recommendation step, since the pipe loop study will be the basis for their treatment recommendation. Commenters indicated that for some systems, coupon studies rather than pipe loop studies may be an appropriate treatment recommendation tool. EPA agrees that coupon studies can be used for systems that do not have LSLs. The final rule only requires harvested pipe loop studies for systems that have LSLs.

Many commenters had concerns with orthophosphate impacts on wastewater treatment. The use of orthophosphate for corrosion control can increase the phosphorus loading to wastewater treatment facilities. However, water systems conducting corrosion control studies cannot rule out orthophosphate simply based on the increase in loading to wastewater treatment facilities. The definition of optimal corrosion control treatment means the corrosion control treatment that minimizes lead and copper concentrations at users' taps while ensuring that the system does not violate any national primary drinking water regulations. SDWA Section 1412(b)(7)(A) requires that a treatment technique prevent known or anticipated adverse effects on the health of persons to the extent feasible. EPA has determined that orthophosphate treatment is a feasible corrosion control technology in accordance with SDWA Section 1412(b)(4)(E). Therefore, eliminating orthophosphate as an option because of concerns unrelated to compliance with national primary drinking water regulations may prevent a system from installing the treatment technique that reduces to the extent feasible the risks of adverse health effects from lead in drinking water. In designing the CCT studies, water systems should evaluate the orthophosphate treatment options in the coupon screening and/or pipe loop/rig studies. EPA has examined the potential costs of additional phosphorus usage on wastewater treatment systems and has included this in the Economic Analysis for the final rule. Many commenters objected to the required evaluations of orthophosphate addition at 1 mg/L and 3 mg/L. Some commenters characterized these as high orthophosphate doses. EPA disagrees that these orthophosphate doses are too high to be considered in the corrosion control study. The commenters may have assumed that the dose was measured as P which would be three times greater than the dose measured as PO_4. EPA is clarifying that the orthophosphate doses to be studied are measured as PO_4. The high-end dose in the corrosion control study of 3 mg/L as PO_4 is at the low end of the typical range used in the United Kingdom where 95 percent of public water supplies are dosed with orthophosphate (Hayes and Hydes, 2010). EPA also notes that the 2018 edition of Recommended Standards for Water Works published by the Great Lakes—Upper Mississippi Board of State and Provincial Public Health and Environmental Managers includes a requirement that total phosphate not exceed 10 mg/L as phosphate sequestering iron and manganese, which are aesthetic concerns and not a health concern. There are also standards in the document for orthophosphate and blended phosphates for corrosion control noting that the system shall have a chemical feed system capable of maintaining an orthophosphate residual of at least 1.0 mg/L as P (3.0 mg/L as PO_4) throughout the distribution system. The member states for this document are Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, and Wisconsin (Great Lakes, 2018).

Some commenters supported the elimination of calcium carbonate stabilization as a corrosion control treatment alternative because they agreed with EPA's rationale that it is not an effective CCT option, but others did not, stating that it worked in some specific circumstances. EPA does not agree that calcium carbonate stabilization should remain as a CCT option. Based upon the available peer reviewed science, EPA has determined that calcium carbonate stabilization treatment does not form a consistent scale on lead and copper pipes to a level that makes it effective as a CCT option (AwwaRF and DVGW-Technologiezentrum Wasser, 1996; Schock and Lytle, 2011; Hill and Cantor, 2011). Therefore, EPA has determined it is not appropriate to require water systems to evaluate it as an option as part of a corrosion control study. Some commenters noted that some water systems have already been deemed optimized using this technique. EPA notes that states will still have the authority to designate the necessary water quality parameters to allow these systems to maintain this treatment as optimal corrosion control unless the system exceeds the lead trigger level or action level.

3. Final Rule Requirements

EPA has included a provision in the final LCRR to identify ''bins'' of systems for specific corrosion control treatment optimization requirements. The first bin is to provide flexibility regarding corrosion control studies for systems that are reoptimizing existing corrosion control treatment following a trigger level exceedance. In the final rule, states are allowed to approve existing

corrosion control treatment modifications without a corrosion control study for systems with lead levels between the trigger level and the action level. To clarify the systems that are not eligible for this flexibility, EPA added a definition of ''systems without corrosion control treatment'' that includes a public water system that does not have, or purchases all of its water from a system that does not have: (1) An optimal corrosion control treatment approved by the State; or (2) any pH adjustment, alkalinity adjustment, and or corrosion inhibitor addition resulting from other water quality adjustments as part of its treatment train infrastructure. Another bin created in the final rule identifies the subset of systems that must do a harvested pipe loop study. This bin includes large and medium systems with LSLs that exceed the lead action levels and any small system with LSLs that selected corrosion control treatment option. For the systems in this bin, Step 1 of the optimization or re-optimization process is the construction and operation of the flow-through pipe loops after the action level exceedance, which must be completed within one year of the exceedance. EPA retained the requirement that coupon studies can only be used as a screening tool for these systems. The final rule includes requirements to allow coupon studies to be the basis for a treatment recommendation tool for other systems that do not have a lead action level exceedance and LSLs.

In the final rule, EPA has also clarified that the orthophosphate doses and benchmarks are orthophosphate measured as PO_4. EPA removed calcium carbonate stabilization as a corrosion control treatment alternative in the final rule.

C. Lead Service Line Inventory

1. Proposed Revisions

EPA proposed to improve the available information regarding LSL numbers and locations by requiring an inventory of service line materials to be prepared by CWSs and NTNCWSs. EPA proposed to require these systems to submit an initial inventory within three years of publication of the rule, and for the water systems to update the inventory annually as they gather more information through the course of their normal activities. EPA proposed requiring the inventory to identify not only LSLs but also galvanized service lines that are or were downstream of an LSL, service lines whose material composition is unknown, and service lines known not to be LSLs. The proposed rule required each LSL to be associated with a locational identifier. EPA proposed that the inventory be made publicly available and proposed that water systems serving greater than 100,000 people would be required to make their inventory available electronically.

2. Public Comment and EPA's Response

Several commenters supported requiring systems to make the LSL inventory publicly accessible because transparency is a critical step for building trust, informing and educating consumers about the sources of lead in drinking water, and reducing risk. Some commenters did not support a requirement to make the inventory publicly accessible, raising concerns that it could infringe on customer privacy and add to confusion, panic, and distrust of the water system, especially if the inventory identifies a high number of LSLs or service lines where the lead status is unknown. Commenters also raised concerns that the requirement could result in unintended impacts to economic development for a community and property values for individual locations with LSLs or lead status unknown service lines. Some commenters raised concerns with the requirement because there are alternatives to allowing open access to the general public (*e.g.,* the requirement for the PWS to provide annual disclosure to customers with LSLs; a requirement to release the information after account verification; or other non-binding measures such as pre-purchase residential inspections).

Many commenters supported the inclusion of specific street addresses in the inventory, citing the increased transparency and the potential to drive proactive LSLR. Some commenters noted that an inventory without addresses would be of limited utility to consumers, given that LSLs impact the individual locations where they are found. Some commenters did not support a requirement to include addresses in the inventory, citing local or state privacy laws that they claim would prohibit the publication of address-level information in their inventory.

EPA agrees with commenters who support a requirement for water systems to make the inventory publicly accessible. Informed customers are better able to take actions to limit exposure to lead in drinking water and make decisions regarding replacement of their portion of a LSL, and to better understand the prevalence of lead sources in drinking water. A Federal requirement for a publicly accessible inventory that uses specific addresses is not necessary, and could complicate implementation of the inventory requirements for those systems that may have concerns about potential conflicts with state or local privacy laws or constitutional protections; therefore, the final rule only requires systems to provide a general location identifier in the publicly accessible inventory. An address is not the only means by which water systems can convey the location of LSLs, other location identifiers could be used such as blocks, streets, landmarks, or other geographic markers that are associated with an individual service line. An inventory that is publicly available with location information provides communities with updated information regarding the total number of LSLs, galvanized requiring replacement lines, lead status unknown lines, and non-LSLs, as well as the general areas where LSLs and galvanized requiring replacement service lines are located. Making this information publicly available also allows the community to track LSLR and material composition verification progress over time. In addition, prospective homebuyers could use the publicly accessible inventory to determine whether and how to work with the homeowner, real estate agent, or home inspector to identify a service line's material composition. For publicly available inventories that do not include addresses as location identifiers, consumers will be individually notified of their service line material classification under 40 CFR 141.85(e), after the water system conducts its initial inventory and annually thereafter. Finally, even though EPA has determined not to establish a Federal requirement to provide specific addresses in the inventory, this does not preclude water systems from doing so. Nor are states precluded by the SDWA from requiring water systems to do so.

EPA received a comment suggesting the final rule strengthen inventory public accessibility requirements, making the inventory available online and extending this requirement to systems serving less than the proposed benchmark of 100,000 people. Requiring more inventories to be available online, commenters said, would allow consumers to more easily access the inventories. EPA agrees with these commenters and is requiring online publishing in the final rule for water systems serving over 50,000 persons, given that websites, social media platforms, and cloud-based file sharing applications are widely available and

can host information for free or low-cost.

EPA received comments on other aspects of the inventory requirements such as the feasibility of creating initial inventories within three years after publication of the final rule. Some commenters believed an inventory could be created within three years, while others claimed that such an effort is not feasible. Some commenters noted the absence of a deadline to verify all service line materials, as is required in Michigan's LCR, and suggested that the final rule include a deadline. Some commenters needed clarification regarding methods for identifying LSLs.

The Agency determined it is practicable and feasible for water systems to prepare the initial inventory by the rule compliance date, as the rule does not require a deadline to verify each service line's composition, allowing unidentified materials to be classified as lead status unknown. It is important that water systems complete the initial LSL inventory within three years of publication of the final rule to facilitate, for example, selection of tap sampling sites under new tiering criteria and to inform consumers about the presence of a known or potential LSL by the compliance date, which is based on Section 1412(b)(10) of the SDWA. The inventory is also critical to determining the number of LSLs to be applied to the LSLR rate under a lead trigger level exceedance and action level exceedance.

EPA disagrees that an end date by which all LSLs and lead status unknown service lines must be verified is warranted or appropriate. The LCR is a national rule which applies to over 60,000 water systems with very different circumstances, including but not limited to the number of service connections, system size, the proportion of LSLs to total service lines, the age of the system, and the accessibility or existence of service line materials records. Water systems with limited or nonexistent records will be more reliant on physical inspection of service line materials, which will require more time and resources than systems with robust records. Additionally, some service line material investigations may require access to private property, but the customer may deny access or not respond to water system outreach, which could challenge a water system's ability to comply with a verification deadline. Some records used for the initial inventory may be outdated or inaccurate, requiring the inventory to be updated over time as new information becomes available. For other systems (such as those with very few lead status unknown service lines), a Federal deadline may discourage or unnecessarily prolong the water system's inventorying efforts. Therefore, EPA determined it is impractical to impose a single deadline for completing an accurate inventory; it is more appropriately treated as an ongoing effort that systems must engage in, while clearly communicating to the public and the state the progress towards completion. The final rule facilitates timely development and verification of the inventory by requiring service line materials to be tracked as they are encountered and through incentives to verify unknowns. By requiring water systems to issue annual notification to consumers served by unknowns, to include unknowns in the replacement rate if the water system exceeds the lead trigger or action level, and to implement risk mitigation measures after disturbance of an unknown, EPA has created incentives for water systems to reduce the number of unknown service lines in their inventory. EPA also requires that water systems include in their LSLR plan a strategy for verifying the material composition of lead status unknown service lines. An inventory verification strategy can improve efficiency by allowing the water system to integrate material composition investigations into its existing standard operating procedures for other activities. For example, if water system personnel are already deployed on a street for a main replacement, they may visually inspect system-owned lead status unknown service lines on that street or engage with affected customers to determine the material composition of the service line entering the home. Water systems may also create a strategy that involves proactive investigation of service line material compositions which is independent of other water system activities, such as the use of predictive models to evaluate the probability a service line is lead and other methods provided or required by the state. Such predictive models could also inform water systems in how they can approach LSLR in a more efficient manner. EPA encourages but does not require this practice as it allows consumers with lead status unknown service lines to be informed sooner about their service line material.

EPA requested comment on the scope of the inventory, including whether it should be required to include customer-owned service lines, galvanized service lines, and lead status unknown service lines. Some commenters believed that the water system should only be responsible for inventorying the service lines under its control, which would exclude all customer-owned service lines. Some commenters suggested that lead status unknown service lines should not be included because inventories with large numbers of unknowns could cause public alarm. Other commenters did not object to inclusion of unknowns but sought for water systems to have the ability to make a judgment about the probability of an unknown being an LSL (for example, a new classification such as ''Unknown but likely non-lead''). Some commenters suggested lead connectors be inventoried.

EPA disagrees with comments suggesting that the inventory requirement in the rule should only apply to service lines if they are owned by the system. Customer owned service lines are connected to either a system-owned service line or main and therefore, they are accessible to the system and historically, the LCR has not been limited to system-owned portions of the distribution system. The LCR has required systems to take actions with respect to portions of the distribution system that are not owned by the water system, including actions related to the materials evaluation and the determination of the number of LSLs in the distribution system for calculating the number of service lines required to be replaced. For example, the LCR has required that ''[t]he system shall identify the initial number of LSLs in its distribution system, including an identification of the portion(s) owned by the system. . . .'' Similarly, the previous LCR has provided that ''where the system does not own the entire LSL, the system shall notify the owner of the line that the system will replace the portion of the line that it owns and shall offer to replace the owner's portion of the line.'' Moreover, where service line ownership is divided between the system and the customer, water system actions can release lead from customer-owned pipes and cause subsequent customer lead exposure. For example, partial LSLR of the system-owned portion can result in a lead spike on the customer-owned portion from physical disturbance as well as lead release from galvanic corrosion. Regarding inventory development, EPA notes that customer-owned service lines are connected to either a system-owned service line or system-owned water main and are therefore accessible to the system. Accounting for locations of customer-owned LSLs will continue to be an integral part of the rule; without it, water systems would not be able to

coordinate replacement of customer-owned LSLs simultaneously with system-owned LSL, take required risk mitigation actions after replacement of a partial LSLR, or provide notice to persons served by LSLs.

EPA disagrees that lead status unknown service lines should be excluded from the inventory. As EPA explained in the proposal, ''[b]ecause water systems may not have complete records to enable them to identify the material for every service line'' the proposed rule would require water systems to identify those lines as unknown, and then update the inventory on an annual basis to reflect more precise information about those lines. (84 FR 61695). EPA determined that such an approach strikes an appropriate balance between a voluntary and mandatory requirement to conduct an accurate and complete inventory of the service line materials in the distribution system. It provides significant flexibility that would not be available if the rule required an accurate and complete inventory by a fixed date; on the other hand, by structuring the replacement requirements so as to incentivize systems to verify the materials of unknown service lines, completion of an accurate inventory is more than an aspirational goal. Including unknown service lines in the inventory will demonstrate transparency, build trust, and present an opportunity for customer engagement, all of which should mitigate commenter concerns about potential customer alarm about the presence of lead status unknown service lines. Exclusion of lead status unknown service lines from the inventory would likely cause significantly more confusion and alarm to the consumers at locations that are excluded from the inventory entirely. Some commenters asked that multiple classifications be introduced for unknowns, for example ''unknown but likely non-lead'' or ''unknown—not lead,'' where records do not exist, but the water system believes the service line is likely not an LSL. A requirement to distinguish the categories of unknown service lines is not necessary for the portions of the rule that use the inventory, and therefore, EPA concluded it would not be appropriate to require in the final rule. Water systems may elect to provide more information in the inventory regarding their unknown lines as long as it clearly distinguishes service lines classified as ''Lead status unknown'' from those whose material has been verified through records or inspection. The distinction between unknown and verified service lines is critical to implementation of the LSLR requirements and will also help to avoid confusion. EPA adjusted the terminology for unknowns from ''service line of unknown material'' in the proposal to ''lead status unknown service line'' in the final rule. This change clarifies that water systems may classify a service line as ''non-lead'' rather than ''service line of unknown material'' where it knows that the service line is not an LSL but does not know the precise material, such as copper or plastic.

EPA disagrees that the final rule should require lead connectors to be included in the inventory. In many cases, records on lead connectors are often extremely limited or may not exist at all. Unlike an inventory of service lines, whose material can be visually inspected often without excavation from inside the home or in the meter box, a complete and accurate inventory of connectors would require excavation that disturbs road pavement and repaving post-inspection—an undertaking that EPA expects would not be feasible or practical for most systems. Instead, EPA addresses the presence of lead connectors by requiring that water systems replace system-owned lead connectors whenever they are encountered during water system activities, such as emergency repairs or planned infrastructure work, and to offer to replace a customer-owned connector at no cost to the system. EPA encourages water systems to voluntarily include information about lead connectors in the inventory where such records exist.

Commenters suggested that annual submission of the inventory to the state would create burden for the water system to submit its inventory and for the state to review it. EPA agrees that for some water systems, annual inventory updates may not be necessary. For example, water systems below the lead trigger level are not required to execute a system-wide LSLR program, meaning they will have fewer inventory changes to report. EPA agrees that linking inventory update frequency with the tap sampling monitoring period would be efficient for water systems and states because tap sampling must be conducted at LSL sites. Changes in the inventory and any resulting changes to the tap sampling plan made to ensure samples are collected at LSL sites can be reviewed by states concurrently. EPA also agrees that for water systems on 6-month monitoring, annual inventory updates are more appropriate given that LSLR rates apply annually.

3. Final Rule Requirements

The final rule requires all water systems to create a publicly accessible LSL inventory. The initial inventory must be available within three years and updated over time to reflect changes, such as verification of lead status unknown service line material compositions or LSLs that have been replaced. All water systems must create an inventory, regardless of size or other water system characteristics, and the inventory must include all service lines in the distribution system, without exclusions. Water systems with only non-LSLs are required to conduct an initial inventory, but they are not required to provide inventory updates to the state or the public and they may fulfill the requirement to make the inventory publicly accessible with a statement that there are no LSLs, along with a general description of the methods used to make that determination. For example, water systems where the entire distribution system (including customer-owned portions of the service line) was constructed after a state or Federal lead ban may designate applicable service lines as ''Non-lead.'' There is no deadline to investigate the material composition of all lead status unknown service lines. Water systems must create a strategy in their LSLR plan for investigating lead status unknown service lines in their inventory. This strategy, coupled with the incentive to investigate unknowns to ease future LSLR burden, will encourage water systems to verify all unknown service line materials in a timely manner. Other rule provisions ensure that customers served by lead status unknown service lines receive protections while inventory development is in progress, such as the requirement to receive targeted information that their service line material is unknown but may be an LSL.

While EPA retained the proposed inventory classifications, the final rule modifies some terminology. To avoid potential customer confusion, galvanized service lines that are or were downstream of an LSL are no longer required to be classified as an LSL. Instead, they must be labeled ''Galvanized requiring replacement'' which allows their correct material composition to be listed while maintaining they are not to be classified as ''Non-lead'' because they must be replaced as part of the system's LSLR program. As previously described, the proposed ''Service lines of unknown material'' are referred to as ''Lead status unknown service lines'' in the final rule.

The classification of ''non-lead'' means that, as in the proposed rule, the water system does not need to identify the exact material of a service line, such as plastic or copper, if it is not an LSL or galvanized requiring replacement service line.

The final rule does not include a requirement to investigate or inventory lead connectors for the reasons discussed above. EPA recommends reviewing records on connector material composition during the records search for the initial inventory. EPA also recommends but is not requiring that water systems inventory connector materials where records exist to provide additional information to consumers about additional lead sources that could contribute to lead in drinking water serving the residence.

The final rule incorporates commenter suggestions to link the inventory update submission frequency with the system's compliance monitoring period or annually, whichever is greater. Because tap sampling must be conducted at LSL sites, changes in the inventory and any resulting changes to the tap sampling plan, to ensure samples are collected at LSL sites, can be reviewed by states concurrently. Water systems on triennial monitoring will be required to provide LSL inventory updates every three years. Water systems that exceed the lead trigger level must conduct tap sampling annually, and therefore, these systems must provide LSL inventory updates annually. Water systems that exceed the lead action level will conduct tap sampling every six months; however, they are required to update the inventory annually.

The final rule requires the LSL inventory to be publicly accessible. The threshold required for water systems to publish their inventory online was reduced to 50,000 persons from the threshold of 100,000 as proposed. Internet platforms, such as websites, cloud-based file sharing applications, and social media, are widely available and can host information for free or low-cost.

These provisions will strengthen the public accessibility to information in the inventory. EPA also added a requirement for the Consumer Confidence Report to include a statement that a service line inventory has been prepared and is available for review either online or at the water system offices.

The final rule requires the publicly accessible inventory to provide a location identifier for lead service lines. The location identifier could be a general location such as a street, block, intersection, or landmark, or other geographic marker associated with the service line. An inventory created and maintained internally by water systems to track service line materials may use the specific address of each service line in order for the water system to provide the required notification under § 141.85(e), but the final rule does not require that the system make the exact street addresses publicly available. Instead, the final rule gives the water system flexibility to determine which location identifier best meets the needs of its own community.

D. Lead Service Line Replacement

1. Proposed Revisions

EPA proposed to accelerate lead service line replacement (LSLR) by proposing LSLR requirements target systems with higher lead levels and that address weaknesses in the current rule to achieve full LSLR in the communities where they are needed most. EPA proposed to require all water systems to replace the system-owned portion of an LSL after they were notified of a customer-initiated replacement of their portion. EPA proposed that water systems above the lead trigger level but at or below the lead action level would be required to implement a ''goal-based'' LSLR program at a rate approved by the state primacy agency. Water systems that exceeded the lead action level would be required to conduct mandatory, full LSLR at a minimum rate of three percent annually. While the proposal did not include a prohibition on partial replacements, it did not incentivize them and included required notification and risk mitigation actions. The proposal promoted full LSLR by allowing only full replacements to count towards the LSLR rate. Partial LSLR and ''test-outs'' would no longer count as a replacement as they do in the current LCR. EPA proposed a provision for water systems to create an LSLR plan by the rule compliance date, which would ensure operating procedures are in place that would ready the water system to perform the technical, financial, and other aspects of LSLR.

EPA proposed that galvanized service lines that are currently or were formerly downstream of an LSL be replaced as part of a water system's LSLR program. These galvanized lines would be included when calculating the annual number of replacements applicable under goal-based or mandatory LSLR. Lead status unknown service lines (called ''service lines of unknown material'' in the proposal) were also proposed to be included in the LSLR rate calculation until the system determines that it is non-lead.

EPA proposed requirements to address elevated lead levels that can result from disturbance of an LSL, such as after a meter replacement or lead connector replacement. EPA proposed risk mitigation steps required after an LSL disturbance, including flushing and delivery of a pitcher filter. EPA also proposed to require systems to replace the lead connectors (including goosenecks, pigtails that have been used to connect service lines to water mains) whenever encountered by the water system in the course of conducting maintenance or replacement of the water mains or adjacent infrastructure.

2. Public Comment and EPA's Response

EPA requested comment on the proposed requirements for water systems to create a LSLR plan. Specifically, EPA asked whether small water systems should be exempt from the requirement to prepare a LSLR plan concurrent with their inventory. Some commenters expressed that small water systems should not be required to create a LSLR plan, claiming that the requirement is too burdensome and potentially unnecessary, given that a small system may not choose LSLR as its compliance option following a lead action level exceedance. EPA agrees that small water systems should not have to recommend a goal LSLR rate within the LSLR plan because small systems would not conduct goal-based LSLR program under the small system compliance path. EPA disagrees, however, that small systems should be exempt from preparing a LSLR plan, as its other components are still relevant to small systems. For example, given that small systems must respond to customer-initiated LSLR, the requirement to develop procedures to conduct LSLR in their plan still applies. Additionally, given that small water systems may still replace LSLs at any time (*i.e.,* after planned infrastructure work or an emergency repair), they must develop a strategy to inform customers before a full or partial LSLR. Furthermore, flushing procedures in the LSLR plan apply after an LSL is disturbed or replaced, which could apply, for example, to small systems replacing water mains or water meters. While there is some upfront burden associated with creating an LSLR plan, the plan could significantly reduce future burden for water systems and will reduce the response time if LSLR is needed. Plan components like the strategy to investigate the material of lead status unknown service lines, identify potential LSLR funding and have

procedures established for LSLR have the potential to significantly reduce the investigation burden that small systems choosing a LSLR compliance path would face after exceeding the action level and will ensure faster implementation. Investigating unknowns will also benefit public health by providing consumers with information about their service line material.

EPA also requested comment on how water systems could identify and prioritize LSLR. Many commenters supported the concept and provided several examples of how LSLR could be prioritized. Commenter recommendations include prioritizing LSLR where large numbers of LSLs are present, tap sampling data indicates high lead levels, construction work is already scheduled, susceptible populations are served (such as child care facilities), areas with older infrastructure, or where disadvantaged populations are located. EPA agrees that water systems should include a prioritization strategy in the LSLR plan, as these and other factors could inform systems' LSLR efforts. Water systems could give specific consideration to, for example, prioritizing locations where susceptible populations are concentrated (such as child care facilities) and where disadvantaged populations live because these populations may be more susceptible to the impacts of lead exposure, or may be more likely to live in environments with other lead exposure sources. Data from the 2005 American Housing Survey suggest that non-Hispanic black individuals are more than twice as likely as non-Hispanic whites to live in moderately or severely substandard housing (Leech et al., 2016). Substandard housing is more likely to present risks from deteriorating lead-based paint (White et al., 2016). Additionally, minority and low-income children are more likely to live in proximity to lead-emitting industries and to live in urban areas, which are more likely to have contaminated soils (Leech et al., 2016). In addition, a water system could identify in its LSLR plan the factors that will guide the prioritization of the LSLRs and how the system will facilitate full LSLR where the customer is unable to pay for replacement of the customer-owned portion of the service line.

EPA requested comment on the proposed requirement that water systems complete the replacement of the water system-owned portion of the LSL within 45 days of a customer-initiated replacement. Many commenters supported this requirement but suggested that water systems should be allowed more time to complete the replacement. Several cities in northern states, commenters noted, have construction moratoriums during winter months. EPA agrees that it may not be possible for water systems to obtain permits and complete LSLR within 45 days, therefore the final rule includes a provision to allow up to 180 days after notification to the state. EPA recommends water systems to establish a process for customer-initiated LSLRs that would allow for up front coordination on timing and would avoid the need for a reactionary replacement, where possible.

EPA sought comment on how the number of replacements under a goal-based or mandatory LSLR program should be calculated. Some commenters pointed out that customer-owned LSLs are outside of the water system's control and they should not be included in the water system's LSLR rate calculation. EPA disagrees that customer-owned LSLR should be excluded from the LSLR program requirements. Under the currently applicable LCR, customer owned service lines are included in the LSLR calculations. Customer-owned service lines must be accounted for in determining the number of initial service lines in section 141.84(b)(1) The initial number of LSLs is the number of LSLs in place at the time the replacement program begins. The system shall identify the initial number of LSLs in its distribution system, including an identification of the portion(s) owned by the system. Excluding customer owned LSLs would continue to promote partial LSLR, which have not been shown to reliably reduce drinking water lead levels in the short-term, ranging from days to months, and potentially even longer. Partial replacements are often associated with elevated drinking water lead levels in the short-term (USEPA, 2011b). EPA notes that while customer-owned lines are not under the direct control of the water systems, there are many actions the water system can take to influence the customers behavior including educating the customer and providing financial assistance, such as loans or grants, to the customer (water systems are not required to bear the cost to replace the customer-owned portion). Moreover, the ''ownership'' status of LSLs is not necessarily static (*e.g.,* it may change as a result of state law or regulations governing public utilities).

EPA specifically requested comment on including galvanized service lines in goal-based and mandatory LSLR rates under the proposed LCR revisions. Some commenters agreed that galvanized lines should be replaced under LSLR programs, noting that science demonstrates that galvanized service lines that are or ever were downstream from an LSL can adsorb lead and contribute to lead in drinking water. Some commenters sought clarification regarding the burden of proof required to determine if a galvanized service line ''ever was'' downstream of an LSL. A few commenters recommended that the final rule take an approach that either requires replacement of all or no galvanized service lines due to the difficulty and burden often required to determine whether a galvanized line ''ever was'' downstream of an LSL. EPA agrees galvanized lines that are or were downstream of an LSL can contribute to lead in drinking water and should be replaced under a system's LSLR program.

Some commenters believed that lead status unknown service lines should not be used in calculating the number of replacements required, while others suggested that water systems should receive replacement credit whenever an unknown is investigated and verified to be non-lead. EPA disagrees that unknowns should be excluded from the LSLR rate calculation. In the final rule, partial LSLR no longer count as a replacement because they do not result in a full LSLR, so allowing unknown verifications to count as a replacement without actually conducting a LSLR would run counter to the final rule's emphasis on full LSLR. Additionally, this policy would not incentivize, and would instead discourage, systems from conducting robust material investigations for their initial inventory or updating their inventory over time, given that improving the inventory would increase their LSLR burden as some unknowns are found to be LSLs. EPA also disagrees that verification of unknowns to be non-lead should count as a replacement. Counting a verification as ''replaced'' could also disincentivize a robust initial inventory in attempts to lower the LSLR burden and allow compliance with LSLR requirements without conducting an LSLR.

EPA requested comment on the goal-based LSLR requirement for systems that exceed the trigger level, asking if a goal-based program provides adequate incentives for water systems to achieve meaningful LSLR, and such a program could be incorporated into existing infrastructure improvement programs. Commenters offered a wide range of views on the new construct. Commenters expressed some support for the proposed requirement, noting it

would increase the number of systems with an LSLR program. Many commenters asked for EPA to be more prescriptive regarding the goal LSLR rate in the final rule. For example, some commenters suggested that EPA should set a Federal goal LSLR rate, while others thought that EPA should set a minimum goal LSLR rate while maintaining the current provision which requires states to set a higher goal rate where feasible. Other commenters suggested that EPA set a maximum goal rate, such as three percent. EPA also requested comment on what criteria must be met for the Agency to establish a Federal goal rate for an individual water system under § 142.19. Some commenters disagreed that EPA should maintain authority to supersede a state-approved goal LSLR rate. EPA disagrees that it should be more prescriptive regarding the goal LSLR rate. The goal-based LSLR program is intended to reflect the specific water system and state's priorities and community characteristics. EPA agrees with commenters that the final rule should not include a provision for the Regional Administrator to establish a goal LSLR rate that would supersede a state decision. States best understand individual water system's characteristics, its technical, financial, and managerial capacity, as well as community demographics. States may also set goal LSLR rates in accordance with statewide replacement policies, such as conducting LSLR in tandem with existing infrastructure work, taking a more active approach to LSLR, or making a determination that a higher replacement rate is feasible.

EPA requested comment on the feasibility of a minimum annual LSLR rate of three percent as a result of a lead action level exceedance. While some commenters thought that a three percent LSLR was too burdensome, others believed the rate was not stringent enough and should be higher. Some noted that the current rule requires seven percent LSLR and claimed that a replacement rate of three percent would be backsliding in violation of the statutory requirement that revisions to existing drinking water standards ''maintain, or provide for greater, protection of the health of persons'' as the existing rule. Some commenters believed that a mandatory LSLR rate should apply at all times and regardless of a water system's lead levels, effectively requiring mandatory, proactive LSLR program at all water systems.

EPA disagrees that a requirement to fully replace three percent of all known and unknown LSLs annually is too slow. Under the previous LCR, many water systems delayed or never initiated LSLR because the rule allows a system to stop LSLR with two bi-annual rounds of tap sampling at or below the action level (AL). A number of scenarios allowed water systems to delay or not begin LSLR. For example, under the previous LCR, water systems without CCT must conduct a study, obtain state approval for the recommended CCT, and obtain state approved optimal WQPs prior to beginning LSLR. Because a CCT study takes longer than one year, many water systems were able to complete two rounds of tap sampling at or below the AL and were not required to complete the CCT study. Further, a water system could delay initiation if the system did not have an accurate LSL inventory and needed time to identify the total number of LSLs in order to determine the number of LSLs required for 7 percent replacement. Meanwhile, that water system could complete two rounds of tap sampling at or below the AL resulting in an end of the LSLR program having replaced few or no LSLs. As a result, very few water systems have conducted LSLR programs under the previous rule. The LCRR no longer allows these delays; systems that exceed the trigger level (TL) must conduct a CCT study so they are prepared to quickly install CCT if there is a subsequent ALE. Also, water systems must prepare an LSL inventory prior to the compliance effective date and systems must conduct four rounds (two years) of bi-annual tap sampling at or below the AL before LSLR may stop. Requiring only full LSLR to count as a replacement will require more time and resources per replacement than partial LSLR, which was allowed in the previous rule because water systems will likely require customer consent to replace their portion of an LSL at customer cost and may need access to the customer's property. EPA notes that as in the previous LCR, states must require systems to replace LSLs on a shorter schedule, *i.e.,* a higher annual percentage than required under the Federal rule, where the state determines a shorter schedule is feasible.

EPA disagrees that reducing the LSLR rate to three percent is backsliding relative to the current LCR. The current LCR does not require full replacement of LSLs and the required seven percent replacement rate is rarely occurring since there are provisions in the current rule that allow for avoidance of LSLR. EPA has determined that the revisions to the LCR, as a whole, maintain or provide for greater public health protection. Because a treatment technique rule is not centered on a single compliance level, but rather on an integrated set of actions designed to reduce the level of exposure to a contaminant, the backsliding analysis for a treatment technique rule should be based on an assessment of public health protection as a result of implementation of the rule as a whole, rather than a comparison of numerical benchmarks within the treatment technique rule. Even when the lead service line removal rates are compared directly, this rule results in a greater rate of removal. Based on data presented in Tables 6–7 and 6–8 of this preamble, improvements in the final rule will result in a 5 to 73 fold increase in full LSLR investments by closing loopholes, improving sampling and monitoring requirements, compelling early action, and strengthening replacement requirements. LSL replacement programs are required to be initiated at systems that exceed the lead trigger level of 10 µg/L versus 15 µg/L in the previous LCR. The requirement for a LSLR plan for all systems will avoid delays in initiating LSLR that have hampered progress under the current rule. Furthermore, the more stringent sampling requirements in the final rule will better identify elevated lead levels associated with LSLs, which will result in more systems that exceed the trigger and action levels and are thus required to replace LSLs. The current rule allows systems to count the line as replaced towards their seven percent removal if a sample taken from an individual line is below 15 µg/L—called ''testing out''—even when no replacement has occurred. The final rule eliminates the ability of water systems to ''test out'' lines from replacement. In addition, while the current rule requires a minimum of one year of mandatory LSLR, the final rule requires water systems to demonstrate lead levels below the 15 µg/L action level for two years before ceasing mandatory LSLR. EPA also notes that the final rule's three percent LSLR rate includes a greater pool of service lines covered by the replacement requirements than the current rule, including not only LSLs, but also lead status unknown service lines and galvanized requiring replacement service lines. Including these known and potential lead sources is expected to result in more service lines requiring replacement under this construct at three percent than under the seven percent required in the previous LCR. Furthermore, the final rule includes provisions requiring water systems to replace lead connectors when encountered and complete

customer-initiated LSLR regardless of their 90th percentile lead levels, rather than requiring those actions only for systems that exceed the action level. This is bolstered by requirements for systems to make their LSL inventory publicly available and notify occupants of homes with LSL every year about their LSL, drinking water exposure risks, and mitigation options, including removal. In addition, only full LSLs will count towards the mandated replacement rate; partial LSLR may still be conducted in certain limited situations, but they will not count in calculating the number of lead lines that have been replaced, in contrast to the current LCR. Therefore, this element of the rule, taken by itself, meets the statutory standard for this rule that it maintains or provides for greater health protection. Lastly, LSLR is just one component of the revised rule. Other strengthened provisions in the rule such as corrosion control treatment, find-and-fix, and public education, will mitigate lead exposure to a greater extent relative to the current rule, and thus the rule as a whole provides more protection than the current rule.

Some commenters suggested use of a rolling average replacement rate across several years to provide more flexibility to the water system than a static annual rate. Commenters noted that in the first year of mandatory LSLR, water systems may receive a high number of requests from customers to have their LSL replaced, while the pool of willing customers may decline in later years. Commenters believed that water systems should respond to as many customer requests as they can, even if it exceeds their mandatory LSLR rate, in order to remove lead sources sooner. Water systems should not be incentivized, commenters said, to replace the minimum number of LSLs in the first year to ensure a sufficient number of willing participants to meet the mandatory LSLR rate in later years. The Agency agrees that a rolling average construct is appropriate for the final rule. As commenters mentioned, a water system may receive heightened customer interest in LSLR immediately following a lead AL exceedance. Replacing more than 3% LSLs in the first year of an LSLR program under a rolling average rate will result in earlier reductions in drinking water lead exposure for those households served by systems that are able to obtain resources for a short term expedited replacement program. This would remove a potential unintended incentive under a fixed rate of 3% to replace the minimum number of LSLs in the first year to ensure there is sufficient customer participation to achieve 3% in the second year. For example, under a rolling average, a system that is able to expedite LSLRs in the first year following an ALE to replace 4% but in the second year is only able to replace 2% will achieve a 3% two year rolling average. EPA notes that while the final rule requires states to set the mandatory LSLR rate higher than 3% where feasible, the short-term ability of a water system to replace more than 3% immediately following a lead AL exceedance when customer interest is highest is not necessarily indicative of long-term feasibility. EPA also notes that a rolling average approach could provide flexibility to water systems that experience delays in initiating LSLR programs. While not mentioned by commenters, some systems may not immediately have access to LSLR financing following a lead AL exceedance, and therefore would face increased challenges to meet the mandatory 3% LSLR in the first year. These challenges could be compounded where the water system experiences delays securing financing and then faces, as commenters noted in the context of customer-initiated replacement, construction moratoriums in the winter months. The rolling average approach could alleviate these challenges. For example, a system that is only able to replace 2% in the first year due to delays may be able to expedite the LSLR program to replace 4% in the second year and achieve a 3% rolling two year average. EPA acknowledges that some households would experience delays in reductions to drinking water lead exposure under this example in comparison to a fixed annual rate. EPA recommends that water systems begin LSLR as quickly as possible following an ALE to assure that the system achieves the required 3% rolling annual average by the end of the second year following the ALE. EPA notes that by having the LSLR plan prepared in advance as required by the rule, systems should be positioned to avoid delays and have timely implementation of their LSLR program. EPA recognizes that potential funding or scheduling delays that may impede a water system's ability to achieve the LSLR rate or circumstances such as higher than average customer interest that may expedite a water system's ability to achieve the LSLR rate may occur throughout implementation of the LSLR program. Therefore, EPA has constructed the rolling average approach for the duration of the LSLR. For example, a water system that continually exceeds the lead AL may expend its initial funding source and need to seek new funding to continue LSLR. The rolling average approach is not intended to address delays caused by customer refusals, as the final rule includes a mechanism for a water system to cease LSLR after it shows no unknowns in its inventory and has received replacement refusals from all customers served by an LSL or galvanized requiring replacement service line.

EPA sought comment on proposed risk mitigation procedures following LSLR or a LSL disturbance, such as the appropriateness of pitcher filters. The proposed rule categorized disturbances into two types: Minor disturbances that require consumer notification and flushing, and more significant disturbances requiring consumer notification, flushing, and pitcher filters. Some commenters claimed that high velocity flushing is appropriate for all disturbances and that filters should not be required as a result of any disturbance. EPA agrees that flushing can be effective at reducing lead in drinking water but disagrees that it is adequate in response to all disturbances. Use of pitcher filters or POU devices over a period of months can help reduce lead exposure from more significant disturbances that may cause sustained elevated lead concentrations over weeks or months. EPA has determined that pitcher filters provide the most viable and efficient option for both water systems and consumers. EPA agrees that POU devices are also effective for risk mitigation and acknowledges that some water systems may prefer POU devices to pitcher filters. It is important to note that systems that elect to distribute POU for risk mitigation after an LSLR are not required to maintain and/or own the devices since they would be used only for short-term mitigation and not for compliance purposes. Small water systems that select POU devices as their compliance alternative must maintain and test devices to be in compliance with the LCRR. EPA also received comments suggesting that notification and risk mitigation be provided after a customer's water is turned back on. A commenter noted that some work may require a customer's water to be turned on and off multiple times. EPA agrees with the commenter that providing notification and risk mitigation before the consumer uses the water is of primary importance and has revised the requirement for notification and risk communication to be provided prior to the water system returning the affected service line to service.

EPA received many comments calling for the final rule to ban partial LSLR

under all circumstances. Commenters noted that partial replacements are not effective at reducing lead in drinking water and may cause a temporary lead spike. Many other comments supported the proposal's allowance of partial replacements, claiming that in some cases partial replacements are unavoidable, such as during emergency repairs. EPA agrees that it is not feasible to ban partial LSLR in all situations. Although partial LSLR can cause lead levels to be temporarily elevated, the practice may sometimes be unavoidable, such as resulting from an emergency repair. In another scenario, other water system activities may result in a significant LSL disturbance and the water system may find it appropriate to remove the portion it owns, while the customer does not agree to replace his or her portion. Because of circumstances such as those, it is appropriate for the rule to not prohibit all partial LSLR. The final rule discourages the practice of partial LSLR by excluding it from counting towards goal and mandatory LSLR rates, while also ensuring risk mitigation steps are taken when partials are conducted. One commenter noted that their state prohibits partial LSLR and considers lead connectors to be part of the LSL. The commenter sought clarification in the final rule as to how systems would comply with their partial LSLR ban as well as the proposed requirement to replace lead connectors as they are encountered. EPA agrees with this commenter and has provided clarification in the final rule to allow an exemption from the requirement to replace lead connectors as they are encountered if state law bans partial LSLR, includes lead connectors in the LSL definition, and requires systems to remove all LSLs irrespective of a system's 90th percentile lead level. This new provision will facilitate compliance with both state and Federal law while ensuring that consistent progress towards the replacement of lead connectors will occur over time.

Some commenters requested that EPA allow verbal refusals or documented attempts to reach a non-responsive customer rather than limiting refusals to customer signatures turning down LSLR as was proposed. EPA agrees with commenters, noting that there may be times where, despite a good faith effort to engage the customer, the water system is unable to reach the customer to obtain a consent or refusal for LSLR. EPA agrees that compliance should be based on the effort to reach the customer to obtain a refusal, and that the water system should not be penalized as a result of customer actions.

3. Final Rule Requirements

All water systems with LSLs or lead status unknown service lines in their initial inventory must create and submit an LSLR plan to their state by the rule's compliance date. The LSLR plan must include a description of: (1) A strategy for determining the composition of lead status unknown service lines in its inventory, (2) procedures to conduct full LSLR, (3) a strategy for informing customers before a full or partial LSLR, (4) for systems that serve more than 10,000 persons, a recommended LSLR goal rate in the event of a lead trigger level exceedance, (5) a procedure for customers to flush service lines and premise plumbing of particulate lead, (6) a LSLR prioritization strategy based on factors including but not limited to the targeting of known LSLs, LSLR for disadvantaged consumers and populations most sensitive to the effects of lead, and (7) a funding strategy for conducting LSLRs which considers ways to accommodate customers that are unable to pay to replace the portion they own. Completing a LSLR plan will prepare water systems to take the steps necessary to remove a source of drinking water lead exposure when required. Water systems will be able to initiate removals in a more timely manner and may be able to more cost effectively identify and remove LSLs with careful preparation and planning.

The final rule does not include a requirement for water systems to include pitcher filter tracking and maintenance plan because water systems will likely distribute the filter and all replacement cartridges simultaneously, making it unnecessary to track filters replacement schedules over time. The final rule adds a new LSLR plan component for water systems to include a strategy for accommodating customers who wish to replace the LSL but are unable to pay the cost of replacing the portion of they own. Nothing in this provision obligates the water system to pay for replacement of a customer-owned LSL. EPA notes potential environmental justice concerns associated with full LSLR when the customer is expected to pay the entire cost to replace the customer-owned portion of the LSL. EPA believes that these impacts can be mitigated by water systems developing a financial assistance strategy ahead of time. In recent years, EPA has become aware of water systems around the country that have successfully adopted one or more approaches for facilitating full LSLR (''Strategies for Achieving Full LSLR,'' docket EPA–HQ–OW–2017–0300). As part of their plan, water systems could investigate whether rate revenue can contribute to customer-owned LSLR or identify external LSLR funding, such as Federal or state grants or loans, that could be used to finance a customer's LSLR. EPA maintains a list of some funding sources that can be used for lead in drinking water reduction activities which can be reached at *https://www.epa.gov/ground-water-and-drinking-water/funding-lead-service-line-replacement.* EPA is also requiring that the LSLR plan must include a replacement prioritization strategy, which will inform how a water system will execute their LSLR program.

The final rule requires the replacement of lead goosenecks, pigtails, and connectors any time they are encountered by the water system. Coupling lead connector replacement with other water system activities, such as main replacement or LSLR, will facilitate consistent progress is made toward elimination of this lead source from drinking water infrastructure over time. A new provision was added to allow systems to comply with state regulations which ban partial LSLR and consider lead connectors part of the LSL.

The final rule requires that water systems complete customer-initiated LSLR within 45 days of being notified by the customer, with the possibility of an extension to 180 days after notification to the state. EPA encourages water systems to establish a process for customer-initiated LSLRs that would allow for up front coordination on timing and would avoid the need for a reactionary replacement of the water system portion of the LSL. To mitigate potential lead exposure associated with a partial LSLR until the system completes the full replacement, the water system must provide the consumer with a pitcher filter or POU device with six months of replacement cartridges, to consumers until the replacement is completed. Because of the potential for partial LSLR to contribute higher levels of lead into drinking water, water systems must also provide the customer with a filter within 24 hours of learning of a customer replacement that left a system-owned LSL in place within the past six months. This new requirement will ensure customers are protected from the effects of partial LSLR, regardless of who owns the remaining LSL portion. Water systems that conduct a full LSLR must also provide customer notification and risk mitigation before the service line is returned to service.

EPA has retained the inclusion of galvanized service lines that are or were downstream of an LSL in the calculation

of the LSLR rate. Water systems are required to presume the galvanized service line was downstream of an LSL if unable to demonstrate that the galvanized service line was never downstream of a lead service line. This approach ensures that all galvanized service lines that may contribute lead into drinking water may be counted towards replacement under the water system's LSLR program. In the final rule, lead status unknown service lines must be considered in determining a water system's annual LSLR rate under a goal-based or mandatory LSLR program. This provides an incentive to water systems to verify the material of lead status unknown service lines.

In the final rule, water systems must recommend a goal LSLR rate in their LSLR plan to be implemented after a lead trigger level exceedance. There is no required minimum or maximum for the recommended goal rate but it must be approved by the state. States may set a different LSLR goal rate than the rate recommended by the system. EPA expects that some systems may propose to conduct goal based LSLR in coordination with planned infrastructure work, while other systems may propose more expansive goal based LSLRs to address the most susceptible or disadvantaged populations. EPA believes it is appropriate for the system to propose a goal LSLR rate based upon an understanding of its individual opportunities and challenges in conducting LSLRs and the priorities in the community for improved public health protection. EPA believes that the primacy agency is in the best position to evaluate the system's recommendation and determine a goal rate.

The final rule retains the proposed minimum mandatory full LSLR rate of three percent after a lead action level exceedance (ALE). The final rule also maintains the LCR's existing requirement that water systems conduct LSLR on a shorter schedule (*i.e.,* greater than three percent annually) where the state has determined it is feasible for the system. The final rule incorporates commenters' suggestions to require that the mandatory LSLR rate be determined based upona rolling two year average. A water system that exceeds the action level must replace a rolling two year average of 3% per year (*i.e.,* starting in year 2 following an ALE, a water system's compliance is determined every year based upon whether it replaced at least 6% in the prior two-year period). As stated in § 141.84(a)(7), the number of LSLRs required under the mandatory LSLR program must be calculated using the number of LSLs and galvanized requiring replacement service lines at the time the system first exceeds the action level plus the number of unknowns at the beginning of each years of the system's LSLR program. A water system that has an ALE must conduct the mandatory LSLR program until the water system's 90th percentile lead levels are at or below the action level for 2 years and the cumulative percentage of LSLs replaced by the system is greater than or equal to 3% times the number of years that elapsed between the system's first ALE and the date on which the system's 90th percentile lead levels are at or below the action level for 2 years. A system with 90th percentile lead levels at or below the action level for 2 years that has not yet replaced the required cumulative percentage of lines, may discontinue LSLR only if it achieves replacement of the cumulative percentage of LSLRs before the end of the third year in which its 90th percentile lead levels are at or below the action level. For example, if a system exceeds the action level and replaces 2% in the first year following the ALE, 4% in the second year, and 2% in the third year that system will have met the requirement for a rolling two year 3% average. However if that system's 90th percentile lead levels drop below the action level in the second year and stays below the action level in the third year, that system cannot stop its LSLR program unless it replaces 1% in the fourth year to achieve a cumulative replacement of 9%.Where a water system fails to achieve its mandatory LSLR rate, it may remain in compliance if it has no remaining lead status unknown service lines in its distribution system and it provides documentation of refusals, or non-response, to the water system's efforts to fully replace all LSLs and galvanized requiring replacement service lines. The final rule builds on the proposal by allowing documentation of two good faith attempts to reach the customers that either resulted in a signed or verbal refusal, or non-response. This provision allows a water system to maintain compliance with the rule in the expected limited cases when customers do not cooperate enough with systems to meet the minimum LSLR requirements in the rule. This provision does not allow refusal of an individual customer to count as a replaced LSL.

The final rule mandates risk mitigation best practices after partial replacements or other actions that cause LSL disturbances. These practices include consumer notification, flushing, a free pitcher filter or POU and replacement cartridges delivered to the affected consumer, and an offer to conduct a follow up tap sample between three and six months following the replacement to ensure lead levels have subsided. While the final rule does not include a ban on partial LSLR, provisions in the revised rule requirements will discourage partial LSLR relative to the previous rule; in addition, the revised requirements will reduce consumer exposure to lead in drinking water when partials and other LSL disturbances occur.

E. Compliance Alternatives for a Lead Action Level Exceedance for Small Community Water Systems and Non-Transient, Non-Community Water Systems

1. Proposed Revisions

EPA proposed revisions that provide small Community Water Systems (CWSs), serving 10,000 or fewer persons, and all Non-Transient, Non-Community Water Systems (NTNCWSs) greater flexibility to comply with the requirements of the LCRR. In 1998, EPA designated corrosion control treatment as an affordable compliance technology for all categories of small systems in accordance with SDWA Section 1412(b)(4)(E)(iii) (USEPA, 1998c). EPA has determined that corrosion control treatment is still an affordable technology for the three categories of small systems, however, EPA recognized that small systems tend to have more limited technical, financial, and managerial capacity to implement complex treatment techniques. Small system flexibilities will provide alternatives to chemical treatment, as it is difficult for many small systems to find operators that have the more advanced skills necessary to implement and maintain such treatment.

EPA proposed three compliance alternatives for a lead action level exceedance to allow increased flexibility for small CWSs that serve 10,000 or fewer people and four compliance alternatives for NTNCWSs of any size. The proposed rule would allow water systems to select the most financially and technologically viable strategy that is effective in reducing lead in drinking water. EPA proposed the following compliance alternatives for small CWSs: (1) Full LSLR, (2) installation and maintenance of Optimized Corrosion Control Treatment (OCCT), or (3) installation and maintenance of point-of-use (POU) treatment devices. EPA proposed the above three compliance alternatives for NTNCWSs and an additional compliance alternative of replacement of all lead bearing plumbing materials.

As proposed, the NTNCWS must have control of all plumbing materials and must have no LSLs to select this option.

2. Public Comment and EPA's Response

EPA requested comment on whether small system flexibility is needed by systems serving between 3,301 and 10,000 persons and whether a different threshold is more appropriate. Several commenters recommended the final LCRR revise the threshold for small systems to those serving 3,300 persons or fewer to be consistent with other drinking water rules. Some commenters supported the proposed LCRR small system definition and recommended that the small system flexibility provisions apply to systems serving 10,000 persons or fewer. Other commenters argue that the proposed threshold of 10,000 or fewer persons is too broad and it would apply to over ninety percent of the nation's water suppliers. These commenters stated that most systems serving 3,301 to 10,000 people likely have sufficient resources to comply with the regulatory requirements for larger systems and do not require the flexibility needed by smaller water systems.

EPA agrees that the appropriate threshold to provide flexibility to small CWS is 10,000 or fewer persons served. The Agency agrees that small water systems serving 10,000 or fewer persons typically do not have the capacity to implement multiple measures simultaneously such as corrosion control treatment and LSLR programs. Small CWSs and NTNCWSs tend to have more limited technical, financial, and managerial capacity to implement complex treatment technique rules such as the LCR (USEPA, 2011a). Many small public water systems face challenges in reliably providing safe drinking water to their customers and consistently meeting the requirements of the SDWA and the National Primary Drinking Water Regulations (NPDWRs) (USEPA, 2011a). The cost of providing service places significant pressure on small water systems because they lack resources and economies of scale (USEPA, 2000c). The Agency determined the compliance flexibility options would be most appropriate for small water systems that serve 10,000 or fewer persons, as they are most frequently the systems that are struggling to maintain compliance with the current LCR and/or do not have the capacity to operate corrosion control treatment in conjunction with other complex treatment technique requirements. Small water systems serving 10,000 or fewer persons have more monitoring and reporting (M&R) violations, approximately 90 percent of all M&R violations for all NPDWRs. Recurring M&R violations can obscure more important water quality problems because MCL and maximum disinfectant residual level (MRDL) violations may not be discovered if a system fails to conduct routine monitoring. M&R requirements are often the simplest compliance requirements and systems that cannot complete these procedures may have other technical, financial and managerial issues (USEPA, 2011a). Small system flexibilities will provide alternatives to chemical treatment as it is difficult for many small systems to find operators that have the more advanced skills necessary to implement and maintain such treatment, particularly given the limited financial and programmatic capacity of many small utilities (Kane, 2018). EPA has concluded that these small systems can work with their state to identify an affordable and feasible treatment technique to reduce drinking water lead exposure. EPA expects that small systems will work with their state to identify the single most cost-effective measure from this list of affordable and feasible compliance options. That measure will depend upon the characteristics of the small system including the number of service connections, the number of LSLs and the technical capacity of the system's operators.

Some commenters recommended that a threshold 3,300 or fewer persons should be used in the final rule as it would allow for consistency across NPDWRs. EPA notes that the NPDWR for lead and copper is a unique and complicated treatment technique rule that requires water systems with elevated lead to take a suite of actions to reduce lead levels in drinking water. To improve public health protection, the final rule maintains or modifies regulatory requirements from the previous LCR and includes new requirements that apply to all system sizes, for example, preparing an LSL inventory, collecting all tap samples from homes with LSLs, conducting ''find-and-fix'' assessments, conducting water system side LSLR when customer initiated LSLR occurs and providing filters, providing filters in the event of an LSL disturbance, and conducting public education outreach to customers served by an LSL. Additionally, the final rule establishes a new trigger level that, when exceeded, prompts a set of actions designed to protect public health. Given the complex requirements associated with this treatment technique rule, EPA has determined that it is not feasible for water systems serving 10,000 or fewer persons to implement the full suite of treatment technique requirements for systems that exceed the action under the final LCRR because, in most cases, they lack the technical, financial, and managerial capacity to do so. EPA has concluded that small system flexibilities are appropriate and allow water systems that exceed the action level, with state approval, to take the lead reduction approaches that both maximize public health protection to the extent feasible and are best tailored to their communities.

EPA does not agree with commenters that support the small system flexibilities only for systems serving 3,300 or fewer persons. EPA recognizes that while small systems serving between 3,301 and 10,000 persons may have greater technical, managerial, and financial capacity than smaller systems, they still face limitations in their capacity to implement multiple treatment technique actions. EPA has determined that it is not feasible for most systems serving 10,000 or fewer persons to implement the multiple treatment technique actions of optimized CCT, PE and LSLR due to limitations in financial, managerial and technical capacity. Implementing such a complex NPDWR as the LCRR treatment technique rule requires consequential managerial, operational, and financial resources investment. New rule requirements, such as implementation of an LSLR goal based program when the lead TL is exceeded and mandatory 3% per year rate based on a two year rolling average LSLR when the AL is exceeded, preparing and updating an LSL inventory, collecting 5th liter samples from LSL sites and collecting tap samples from 100% LSL sites, conducting find-and-fix actions, testing in schools and child care facilities and conducting enhanced PE all represent significant new requirements for water systems. Small water systems will need to comply with all of these new LCRR components. Therefore, EPA has determined that systems serving 10,000 or fewer persons have less professional staff than larger systems; these systems have an average of 0.4 to 2.4 full time operators and 0.5 to 2.4 managers per system, which is approximately 2 to11 times less than the average number of operators in the larger systems. Average revenues for systems serving 10,000 or fewer persons are about 4 to 170 times smaller than average revenues for large systems (USEPA, 2009).

Other commenters assert that POU treatment is implementable only in very small water systems. Some commenters

stated that POU treatment is not an appropriate option for small systems since they could not properly train users on how to maintain them. Other commenters suggested the POU treatment option is not cost-effective compared to corrosion control treatment for systems serving more than 3,300 people.

EPA also recognizes the concerns over POU device maintenance problems; however, with proper installation and maintenance provided by the water system, including changing filter cartridges and resolving operational issues experienced by the user, POU devices are an effective option for some small CWSs and NTNCWSs. When POUs are identified by EPA in the list of technologies for small system compliance, Section 1412(b)(4)(E)(ii) of the SDWA requires PWSs using POU treatment units to own, control, and maintain the treatment units to ensure proper operation and maintenance and compliance with the treatment technique. It also requires that the POUs be equipped with mechanical warning devices to ensure that customers are automatically notified of operational problems. EPA believes that some small water systems can cost effectively install and maintain POU devices in their customer's homes and can educate their customers on the proper operation of these devices. Most NTNCWSs own and control all the outlets in their system and can ensure proper operation and maintenance of installed units. In addition, smaller CWSs serve fewer persons for which they would need to provide POU devices compared to larger CWSs.

In the proposal, EPA also requested comment on whether different flexibilities would be more appropriate for small systems. Many commenters recommended that the lead-bearing plumbing replacement option proposed for NTNCWSs should be also extended as a compliance option for small CWSs. Commenters noted that this option could be beneficial for some small CWSs that do not wish to operate OCCT or install POU devices in perpetuity but have lead bearing plumbing materials that are in their control. One commenter wrote that small CWSs that control the premise plumbing include public water systems that are owned and operated by assisted living facilities, boarding schools, prisons, and apartment buildings. EPA agrees with the commenters and acknowledges that in certain circumstances, when small CWSs have no LSLs and have control of all of the plumbing materials in the system, replacement of all lead-bearing plumbing material might be feasible, affordable, and a more effective option than CCT for the system to reduce drinking water lead exposure.

Some commenters expressed concerns that small CWSs that elect to conduct LSLR would not be required to implement immediate measures to reduce lead exposures. One commenter noted this approach ''is not acceptable from public health, health equity or environmental justice perspectives'' because it creates the potential for consumers to be exposed to high lead levels for up to 15 years without CCT or POU devices in place. Other commenters were concerned that small CWSs that elect to implement CCT would not be required to undertake LSLR. These commenters noted that this approach allows LSLs to remain in the ground indefinitely, thus raising ''serious environmental justice concerns.''

EPA agrees that systems serving greater than10,000 persons can and should implement both corrosion control treatment and LSLR programs if the system exceeds the action level. For systems serving less than 10,000 people, EPA has determined it is appropriate to retain both LSLR and CCT as compliance alternative options as outlined in the proposed LCRR. CCT may be the most appropriate option for small CWSs and NTNCWSs that have many LSLs because LSLR is a resource-intensive process and may not be a feasible solution for some systems. LSLR, on the other hand, may be a feasible option for small CWSs and NTNCWSs that have fewer LSLs and that could be removed within a few years. The state must require a system to replace LSLs on a shorter schedule, taking into account the number of LSLs in the system, where a shorter replacement schedule is feasible. The LSLR option could allow those systems to avoid the need to add a CCT process that would require continual operation and maintenance. EPA has determined that it is not feasible for small systems serving fewer than 10,000 to both operate optimized CCT and conduct LSLR. As explained in greater detail above, these systems have limited operator staff to manage CCT and LSLR programs. Systems serving 10,000 or fewer persons do not enjoy the economies of scale of larger systems therefore the cost of multiple treatment technique actions may not be affordable for these smaller systems. Additionally, the LCRR includes several public education requirements including annual notice to sites served by an LSL that will provide consumers with information about the risks of the LSLs and the actions they can take to reduce their risks. Regardless of the compliance options selected, all water systems are required to conduct public education when the lead action level is exceeded. Finally, the LCRR will afford all NTNCWSs and small CWSs the flexibility to evaluate the best treatment technique for them to control lead and to implement their chosen approach based on state approval.

3. Final Rule Requirements

Under the final LCRR, small CWSs that serve 10,000 persons or fewer and any NTNCWS that exceeds the lead trigger level but do not exceed the lead and copper action levels must evaluate the four compliance alternatives and make a recommendation to the state within six months on which compliance alternative the water system would implement if the water system subsequently exceeds the lead action level. The state must approve the recommendation or designate an alternative compliance option within six months of submittal. In the event these water systems exceed the lead action level, they must implement the state-approved compliance option.

Any small CWSs and any NTNCWS that exceeds the lead action level and had not previously exceeded the trigger level, must evaluate the compliance alternatives and make a recommendation to the state within six months. The state must approve the system's recommendations or designate an alternative compliance option within six months; these water systems must implement the state-approved compliance option.

a. Lead Service Line Replacement

Water systems that select and are approved for LSLR and subsequently exceed the lead action level are required to implement a full LSLR program on a schedule specified by the state, not to exceed 15 years. EPA is requiring that NTNCWSs and small CWSs with LSLs that exceed the lead action level of 15 µg/L that choose to fully replace all of their LSLs until none remain must ensure they have the authority or consent to remove the customer-owned portion of every LSL in its distribution system or obtain refusals from customers. If the water system's 90th percentile drops below the lead action level, the water system must continue to replace LSLs until none remain. This option is projected to be a feasible and affordable, as well as practical choice for small systems that have few LSLs that could be removed within a few years, thus potentially avoiding the need to add a CCT process that would

need to be continually operated and maintained.

b. Corrosion Control Treatment

Water systems that select and are approved for implementation of optimized CCT and subsequently exceed the lead action level are required to implement the state-approved option for CCT. The final rule provides flexibility for NTNCWSs and small CWSs to install and maintain optimized CCT as a compliance alternative after exceeding the lead action level. EPA has determined in its analysis that some water systems may choose this alternative as the feasible, affordable, and most effective strategy for reducing lead in drinking water (*e.g.,* small water systems with many LSLs to replace or a large number of households and non-residential buildings that would make installation and maintenance of POU devices logistically challenging) (see section VI.C.4 of this preamble). EPA is requiring water systems, including small water systems, that have already installed CCT and subsequently exceed the lead action level to re-optimize CCT.

c. Point-of-Use Devices

Water systems that select and are approved for the POU option and subsequently exceed the lead action level, are required to implement a POU program on a schedule specified by the state, but not to exceed one year for CWSs and three months for NTNCWSs. The final rule provides flexibility for NTNCWSs and small CWSs to install and maintain POU devices, independently certified by a third party to meet the American National Standards Institute standard applicable to the specific type of POU unit to reduce lead in drinking water, as a compliance alternative to a lead action level exceedance in lieu of CCT and LSLR. EPA is requiring small CWSs that select this compliance alternative to provide a minimum of one POU device per household and one for every tap that is used for cooking and/or drinking in every building in its distribution system, regardless of whether that household or building is served by an LSL, to ensure the residents can access filtered water. Since system-wide CCT is not being provided under this option, even homes and non-residential buildings without LSLs would need to be provided with a POU device to address lead leaching from old lead solder or brass plumbing fittings and fixtures. EPA is requiring NTNCWSs to provide a POU device for every tap intended for drinking or cooking to ensure all building users can easily access filtered water. The water system is responsible for maintenance of the device, including changing filter cartridges and resolving operational issues experienced by the customer. Small CWSs that serve relatively few households, or NTNCWSs that are responsible for the facility's plumbing, may find this to be the feasible, affordable, and most effective compliance alternative (see section VI.C.4 of this preamble). Small CWSs must ensure water system personnel have access to the homes of the residents and the non-residential structures to install and maintain the POU devices, including changing the filters. Systems are also required to provide instructions on the proper use of POU devices to maximize the units' lead level reduction effectiveness.

d. Replacement of Lead Bearing Plumbing Materials

Water systems that select and are approved to replace all lead-bearing plumbing and subsequently exceed the action level are required to replace all lead bearing plumbing on a schedule specified by the state, but not to exceed one year. Under the final rule, NTNCWSs and small CWSs that have control over all plumbing in its buildings and no LSLs may choose to replace all lead bearing plumbing in response to a lead action level exceedance. EPA is requiring that the replacement of all lead bearing plumbing occur on a schedule set by the state which must not exceed one year.

F. Public Education

Under the current LCR, water systems that exceed the lead action level must initiate a public education program within 60 days of the end of the tap sampling period in which the action level exceedance occurred. The purpose of public education is to inform consumers that elevated levels of lead have been found in the drinking water, provide information about sources of lead in drinking water, provide information about the health effects of lead, and explain the actions consumers can take to reduce exposure as well as the actions the water system is taking to reduce drinking water lead levels. Under the current rule, water systems are required to provide consumers with their tap sample results within 30 days.

1. Proposed Revisions

Proposed revisions included a requirement for systems to update public education materials with revised mandatory health effects language. EPA proposed to modify requirements to provide consumers with their lead tap sample results within 24 hours if the sample is greater than 15 µg/L, while maintaining the current rule requirement to provide tap sample results within 30 days for sample results less than or equal to 15 µg/L.

EPA proposed additional public education requirements following a lead action level exceedance. EPA proposed that CWSs conduct annual outreach to state and local health agencies to explain the sources of lead in drinking water, describe health effects of lead, with the expectation they would explore collaborative efforts. EPA proposed a requirement for systems with LSLs to annually notify consumers served by an LSL or service line of unknown lead status and to provide them with public education annually until the LSL is replaced or the unknown service line is determined not to be an LSL. EPA proposed that this notification inform consumers of the health effects and sources of lead in drinking water (including LSLs), how to have water tested for lead, actions consumers can take to reduce exposure to lead, and information about the opportunities for LSLR, including the water system's requirement to replace its portion of an LSL when notified by a customer that they intend to replace the customer-owned portion of the LSL.

EPA also proposed additional public education requirements for water systems that are required to conduct a goal based LSLR program but that fail to meet their annual LSLR goal. EPA proposed to require those systems to conduct additional public outreach activities to increase customer awareness of the potential higher exposure to lead from an LSL and advance customer interest in participating in the goal based LSLR program. EPA proposed that CWSs conduct one or more of the following annual public outreach activities, until the water system meets its replacement goal: (1) A social media campaign (*e.g.,* Facebook, Twitter), (2) outreach to organizations representing plumbers and contractors to provide information about lead in drinking water including health effects, sources of lead, and the importance of using lead free plumbing materials, (3) certified mail to LSL customers inviting them to participate in the LSLR program, (4) conduct a town hall meeting or participate in a community event to provide information on the LSLR program, (5) visit targeted customers to discuss LSLR program and opportunities for LSLR, or (6) obtain written refusal from all LSL customers to participate in the LSLR program. Outreach to organizations representing plumbers and contractors is included as an outreach activity that

systems may conduct, as plumbers and contractors may also be a source of information about lead in drinking water for customers and may help with identifying LSLs during home repair.

EPA proposed that CWSs conduct annual outreach to state and local health agencies to explain the sources of lead in drinking water, describe health effects of lead, and explore collaborative efforts.

2. Public Comment and EPA's Response

EPA received many comments on the mandatory health effects language required in all public education materials, the CCR, and the 24 hour public notice of a lead action level exceedance. Some commenters characterized the proposed language as redundant, too long and not clearly stating the level of risk. Some commenters recommended using more definitive language about the health risk in adults. Some commented that the language improperly describes the scientific evidence on adult risks as ''recent.'' Several commenters provided suggestions for making the language clearer and more concise. EPA has revised the mandatory health effects language in the final rule to address many of these suggestions and to provide better risk communication and improve accuracy and clarity, resulting in a more concise message and simpler sentence structure for clearer communication.

EPA also received comments on the proposed consumer notice requirement for individual samples that exceed 15 µg/L. Many commenters expressed concern over the ability of water systems to deliver a notice to consumers within 24 hours of learning of a tap sample over 15 µg/L and recommended that water systems be allowed two business days to notify consumers. After considering these comments, EPA has determined that it may not be possible for water systems to provide consumer notification within 24 hours, therefore the final rule will require water systems to provide the consumer notification as soon as practicable but no later than 3 calendar days. Once systems receive tap sample results that exceed 15 µg/L, they can choose from several options that make it feasible to provide the consumer notice within 3 days, including delivery electronically, by phone, hand delivery, mailing with a post mark within 3 days, or any other method approved by the state.

EPA requested comment on whether the Agency should require water systems to distribute public education materials to homes with unknown service line types to inform them of the potential for their service line to be made of lead and the actions they can take to reduce their exposure to drinking water lead. Many commenters supported the new provision and noted that it would encourage homeowner engagement in LSLR, while some expressed concern that notifying consumers that their service lines are of unknown lead status may cause fear and distrust of the water system. EPA does not find any compelling evidence that public education to consumers with lead status unknown service lines would cause increased fear and distrust so is finalizing requirements to notify customers with an LSL and lead status unknown lines. Persons served by a lead status unknown service line may decide to take steps to determine the material of their service line and/or take measures to reduce their potential exposure to lead in drinking water. Providing information to aid customer decision making should provide greater transparency increasing trust.

EPA requested comment on the appropriateness of required outreach activities a water system should conduct if they do not meet the goal LSLR rate in response to a trigger level exceedance. EPA also requested comment on other actions or additional outreach efforts water systems could take to meet their LSLR goal rate. Many commenters supported outreach to encourage participation in the LSLR program but expressed concern about how well the activities followed risk communication best practices. Commenters expressed concern that some of the outreach activities (*e.g.,* social media campaign) would exclude some consumers. EPA agrees that a social media campaign on its own may exclude some segments of the population and has revised the outreach requirements in the final rule to be more inclusive. In the final rule, conducting a social media campaign is still an option but must be accompanied by at least two other forms of outreach to ensure that water systems reach individuals who may not use social media. At least one of the activities must include the following: (1) Send certified mail to customers with lead or galvanized requiring replacement service lines, inviting them to participate in the LSLR program, (2) conduct a townhall meeting, (3) participate in a community event to provide information about its LSLR program and distribute public education materials, (4) contact customers by phone, text message, email or door hanger, or (5) use another method approved by the state to discuss the LSLR program and opportunities for LSLR. Many commenters suggested alternative means for reaching customers such as newspapers, television, radio, and reverse 911 calls, or that states be able to approve alternative methods. EPA has added some of the outreach efforts commenters suggested (*e.g.,* newspaper, television, and radio) as additional options that CWSs may select if they continue to fail to meet their goal LSLR. In addition to conducting at least one of the above five activities, CWSs must conduct at least two activities from the following list if they continue to fail to meet their goal LSLR: (1) Conduct a social media campaign, (2) conduct outreach via newspaper, television, or radio, (3) contact organizations representing plumbers and contractors by mail to provide information about lead in drinking water, or (4) visit targeted customers to discuss the LSLR program and opportunities for replacement.

EPA requested comment on the appropriateness, frequency, and content of required outreach to state and local health agencies and whether the requirement should apply only to a subset of the country's CWSs. Many commenters supported requiring water systems to engage with public health agencies; however, they expressed concern that an annual report from all CWSs to local and state health agencies would not be an effective way to encourage collaboration and would overload health agencies with virtually the same information. Some commenters suggested that the outreach requirement be limited to CWSs with action level exceedances or CWSs with LSLs. Additionally, many commenters recommended that outreach be led by the state. EPA acknowledges concerns about the amount of information health agencies would be receiving from water systems; however, under the final rule each CWS will provide unique information. In addition to providing important information on sources of lead in drinking water and actions to reduce lead in drinking water that health agencies may incorporate in their lead poisoning program materials, CWSs must also provide system-specific information about find-and-fix activities and information about school and child care facility testing. Therefore, it is important that all CWSs provide this information so that the state and local health agencies in their service area can evaluate it along with other data they may have such as blood lead levels and take steps to investigate other potential sources of lead in the communities they serve. The purpose of this outreach is

also to provide an opportunity for CWSs to explore collaborative efforts with local and state health agencies and work together on public education programs; therefore, EPA believes it is important for all CWSs to participate. Collaborating with local and state health agencies serves as an additional way for CWSs to reach consumers who may be affected by lead in their drinking water, so they can take measures to reduce their exposure.

Many commenters requested clarification of whether this provision requires systems to provide public education to health care providers and caregivers. EPA acknowledges commenters' confusion and has clarified that is not required in the final rule. The requirement is for annual outreach to local and state health agencies. Some commenters also expressed concern with the January 15 deadline and recommended that it be conducted on the same schedule with the Consumer Confidence Report (CCR) or other required outreach. In response, EPA has updated the reporting date to July 1, consistent with the CCR.

3. Final Rule Requirements

EPA is requiring public education materials to include the following revised mandatory health effects statement:

Exposure to lead in drinking water can cause serious health effects in all age groups. Infants and children can have decreases in IQ and attention span. Lead exposure can lead to new learning and behavior problems or exacerbate existing learning and behavior problems. The children of women who are exposed to lead before or during pregnancy can have increased risk of these adverse health effects. Adults can have increased risks of heart disease, high blood pressure, kidney or nervous system problems.

EPA is requiring that water systems must notify persons served at the sampling site for any individual tap sample that exceeds 15 µg/L, as soon as practicable but no later than 3 days after receiving the sampling results. This is in addition to the existing LCR requirement to provide a notice of the individual tap sample results from lead testing to persons served at the sampling site, which must be sent within 30 days of receiving results. For tap samples that do not exceed 15 µg/L, the 30-day consumer notice will remain in effect. In the final rule, water systems that have individual tap samples greater than 15 µg/L must also implement the ''find-and-fix'' provisions as described in section III.K of this preamble.

EPA is requiring systems with lead, galvanized requiring replacement, or lead status unknown service lines in their inventory to notify and provide public education materials to households served by a lead, galvanized requiring replacement, or lead status unknown service line. Targeted public education for persons served by a lead, galvanized requiring replacement, or lead status unknown service line is intended to raise awareness of people in a household that may have higher lead exposures so that they may take actions to reduce exposure to lead and participate in LSLR programs. CWSs must provide this notification and public education annually until the LSL or galvanized requiring replacement service line is replaced or the lead status unknown service line is determined not to be an LSL. The notice is required to include a statement that the person served by the water system has an LSL, galvanized requiring replacement, or lead status unknown service line, information on the health effects of lead, and actions they can take to reduce exposure to lead. For persons served by an LSL or galvanized requiring replacement service line, the notice must also provide information about the opportunities for LSLR, including the water system's requirement to replace its portion of an LSL when notified by a property owner that they intend to replace their portion of the LSL. This notification must include a description of any programs that provide financing solutions for property owners seeking to replace their portion of an LSL, if such funding is available. For persons served by a lead status unknown service line, this notice must include information about ways that homeowners can verify the material of the service line. EPA is also requiring water systems with LSLs that exceed the lead trigger level of 10 µg/L to provide information about their LSLR program and opportunities for LSLR to persons served by LSLs or lead status unknown service lines. Systems must send the notification within 30 days of the end of the monitoring period in which the trigger level exceedance occurred and repeat it annually until the system is no longer in exceedance.

Additionally, EPA is requiring water systems that cause a disturbance to a lead, galvanized requiring replacement, or lead status unknown service line to notify persons at the service connection and provide them with information to reduce their exposure to potentially elevated lead levels. This can include disturbances resulting in the water to an individual service line being shut off or bypassed, such as operating a valve on a service line or meter setter. It can also include disturbances caused by partial or full LSLR or those resulting from the replacement of an inline water meter, a water meter setter, or gooseneck, pigtail, or connector.

EPA is requiring CWSs serving more than 10,000 persons that fail to meet their annual LSLR goal to conduct additional public outreach activities. Failure to meet the LSLR goal, by itself, will not be a violation of the treatment technique or monitoring and reporting requirements; however, failure to conduct public outreach activities will result in a treatment technique violation. To increase customer awareness of the potential higher exposure to lead from an LSL and advance customer interest in participating in the goal based LSLR program, water systems must conduct annual public outreach activities until the water system meets its replacement goal or a water system is no longer required to perform a goal based LSLR program. To enhance community engagement and allow water system flexibility as suggested by the NDWAC, EPA is providing options to meet this requirement, so water systems can conduct effective community engagement. A water system that does not meet its LSLR goal rate must select at least one of the following outreach activities to conduct in the following year: (1) Send certified mail to customers with lead or galvanized requiring replacement service lines inviting them to participate in the LSLR program, (2) conduct a town hall meeting, (3) participate in a community event to provide information on the LSLR program and distribute public education materials, (4) contact customers by phone, text message, email, or door hanger, or (5) use another method approved by the state to discuss the LSLR program and opportunities for LSLR. If the water system continues to fail to meet the annual replacement goal in the following year, the water system must conduct one of the above activities and at least two additional outreach activities per year from the following activities to promote participation in the LSLR program: (1) Conduct a social media campaign (*e.g.,* Facebook, Twitter), (2) conduct outreach via newspaper, television, or radio, (3) contact organizations representing plumbers and contractors by mail to provide information about lead in drinking water including health effects, sources of lead, and the importance of using lead free plumbing materials, (4) visit targeted customers to discuss the LSLR program and opportunities for

replacement, or (5) obtain written refusal from all LSL or galvanized requiring replacement service line customers to participate in the LSLR program. A refusal includes a signed or verbal statement by the customer refusing LSLR, or documentation of no response after two good faith attempts to reach the customer. Water systems must provide written certification to the state that they have conducted the required outreach activities under this rule.

In addition, EPA is requiring that CWSs conduct annual outreach to state and local health agencies to discuss the sources of lead in drinking water, health effects of lead, steps to reduce exposure to lead in drinking water, and information on find-and-fix activities. CWSs are expected to use this as an opportunity to collaborate with state and local health agencies. State and local health agencies include the state health department and city or county health department. For tribal systems, this would be the Indian Health Service Area, Division of Environmental Health Services program, or applicable tribal program if administered through self-determination contracts or compacts under the Indian Self-Determination and Education Assistance Act. This annual outreach will provide an opportunity for water utilities to participate in joint communication efforts, led by state health departments, state lead poisoning prevention agencies, and/or state drinking water primacy agencies (NDWAC, 2015). By working together, CWSs and health agencies can help ensure that caregivers, health care providers, and communities they serve hear and respond appropriately to information about lead in drinking water. CWSs may also use this as an opportunity to develop public education materials in consultation with health agencies. EPA is clarifying the content of the annual outreach to local and state health agencies in the final rule to include providing information about find-and-fix activities conducted in the previous calendar year, including the location of the tap sample site that exceeded 15 µg/L, the result of the initial tap sample, the result of the follow up tap sample, the result of water quality parameter monitoring and any distribution system management actions or corrosion control treatment adjustments made. EPA is also changing the reporting date from January 15 to July 1 to coincide with notifying local and state health agencies of school sampling results, consistent with the CCR. CWSs may send one letter that covers both find-and-fix activities and school sampling results to local and state health agencies.

EPA is requiring that small CWSs and NTNCWSs that select POU devices as their compliance option in response to a lead action level exceedance must provide public education materials to inform users how to properly use POU devices to maximize the units' effectiveness in reducing lead levels in drinking water.

G. Monitoring Requirements for Lead and Copper in Tap Water Sampling

1. Proposed Revisions

Several changes to the LCR were proposed in the LCRR to improve tap sampling requirements in the areas of site selection tiering criteria, sample collection methods, and sampling frequency. In addition, to improve transparency and raise consumer awareness, EPA proposed that water systems make the results of these tap samples publicly available within 60 days of the end of the tap sampling monitoring period.

EPA proposed revisions to tiering criteria for selection of tap sampling sites to better target locations expected to have higher levels of lead in drinking water. Under the proposed LCRR, Tier 1 sampling sites for CWSs consist of single-family structures (SFS) that are served by an LSL. When multiple-family residences (MFRs) comprise at least 20 percent of the structures served by a water system, the water system may include these types of structures (served by an LSL) in its sampling pool as Tier 1 sampling sites. However, a large apartment building would be unlikely to have an LSL. EPA proposed Tier 2 sampling sites for CWSs to be buildings, including MFRs that are served by an LSL. EPA also proposed that Tier 3 sampling sites for CWSs consist of SFSs that contain copper pipes with lead solder installed before the effective date of the applicable state's lead ban. EPA proposed that NTNCWS Tier 1 sampling sites consist of buildings that are served by an LSL and the remaining tap samples be taken at buildings with copper pipe and lead solder installed before the effective date of the applicable state's lead ban (Tier 3 sites). EPA did not modify the definition of a ''representative site'' but referred to it as a ''Tier 4'' site in the proposal.

EPA proposed additional requirements for water systems to enable prioritization of LSL sites in tap sampling. Under the LCRR proposal, all water systems with LSLs or potential LSLs must re-evaluate their lead sampling sites based on their LSL inventory. These water systems would be required to update their inventory annually and ensure tap sampling sites are served by an LSL. Under the current LCR, water systems with LSLs must collect at least half of their tap samples from sites with known LSLs. However, in the proposal, water systems with LSLs would be required to collect all tap samples from sites with known LSLs if possible. Under the proposal, water systems with an adequate number of LSL sites to meet the required minimum number of tap sampling sites must calculate their lead 90th percentile using only tap samples from LSL sites (100 percent LSLs).

EPA proposed that if a water system does not have an adequate number of LSL sites to meet the minimum number of tap samples to calculate the 90th percentile level, it may collect the remainder of the samples from non-LSL sites only after all the LSL tap sampling sites are utilized. If the water system conducts tap sampling at non-LSL sites beyond what is required, EPA proposed that the water system could only include the tap samples with the highest lead concentrations to meet the number of requisite sites for the 90th percentile calculation. EPA also proposed that tap samples collected which are not used in the lead 90th percentile calculation must still be reported to the state.

EPA proposed the use of grandfathered data to determine their tap sampling monitoring schedule if the data were from sites that met new requirements. Water systems that collect lead tap samples after the publication date of the final rule, but before the rule compliance date (three years after final rule publication), in accordance with the proposed tap sample site selection criteria, could use data to determine the tap sampling monitoring schedule. EPA proposed that water systems which do not have qualifying grandfathered data, must use the lead 90th percentile results from the first tap sampling monitoring period after the compliance date of the final rule. There were no proposed changes to the copper sampling requirements. However, due to the proposed increased tap sampling frequency requirements for lead, each tap sample collected may not need to be analyzed for both lead and copper as schedules may diverge for some water systems.

EPA proposed a lead trigger level of 10 µg/L which affects the tap sampling frequency. Under the proposal, water systems that exceed the lead trigger level of 10 µg/L but do not exceed the copper and lead action levels and are conducting tap sampling on a triennial basis, would begin annual tap sampling at the standard number of sites for lead

but may remain on triennial sampling for copper at the reduced number of sites. EPA proposed that water systems that do not exceed the lead trigger level for three consecutive years of annual monitoring could reduce their lead monitoring to triennial at the reduced number of sites.

Under the proposal, qualification for reduced monitoring would be contingent upon several factors, including but not limited to, results of lead and copper tap sampling, the size of the water system, and maintaining water quality parameters (WQPs) for optimized CCT. The schedule for tap sampling may be affected when these factors change. Criteria for reduction in tap sampling frequency and number of sites were more stringent in the proposal compared to the current rule. A water system must not exceed the trigger level of 10 µg/L to be eligible for a triennial monitoring schedule at the reduced number of tap sample sites for lead, and large water systems are not eligible for triennial monitoring unless they meet the practical quantitation level (PQL). The proposed revisions to tap sampling frequency and locations were meant to ensure more frequent tap sampling would occur at sites more likely to have elevated lead levels.

EPA proposed several changes to the tap sampling protocol, consistent with the Agency's February 2016 memorandum (USEPA, 2016d). Specifically, EPA proposed to prohibit tap sample instructions that include pre-stagnation flushing, aerator removal prior to tap sampling, and use of narrow mouth collection bottles. EPA also proposed that tap samples be collected in wide-mouth bottles that are one liter in volume. Wide-mouth bottles are advantageous for lead and copper tap samples because they allow for a higher water flow rate compared to a narrow-necked bottle. Collection of tap samples using a wide-mouth bottle is more characteristic of faucet water flow when filling a glass of water.

2. Public Comment and EPA's Response

EPA did not propose to change the current LCR sampling protocol requirement for samples to be one liter first draw tap samples. However, EPA did request comment on alternative tap sampling procedures for locations with an LSL; specifically, whether water systems with LSLs should collect a tap sample representative of water in contact with the LSL (*i.e.,* the ''fifth liter''). EPA received a wide variety of comments on this topic, with many in support of the fifth liter and several opposed to it. Some commenters suggested collecting both a first liter and a fifth liter sample and using the highest copper and lead result in the 90th percentile calculation. Others commented on the method in EPA's request for comment of collecting a first draw copper sample and a fifth liter lead sample. Those that supported collecting a fifth liter state that the current first liter tap sampling protocol does not capture lead from the highest source, the LSL, thereby providing a false sense of security to residents, while a fifth liter could more accurately capture the highest lead levels at the site. These commenters state that the first liter protocol fails to measure the impact of the greatest contributor to lead levels in the home, the LSL. Commenters emphasized that the first liter can capture lead from premise plumbing but does not effectively capture lead levels from the service line, since it may extend 50 feet or more from the building. Commenters stated the fifth liter sample will better identify systems that should take action to address elevated lead levels. The commenters that were opposed to the fifth liter sample, stated that this technique would be too complicated for residents to carry out, resulting in more confusion and sampling errors. Commenters noted that if the fifth liter sample option is finalized, samplers will need to be well trained in this method. Other commenters disagreed with the fifth liter sample, because they argue it is not consistent with how a consumer would use the water.

Tap sampling is required under the LCR to evaluate the effectiveness of corrosion control treatment and to determine if additional actions including LSLR are needed to reduce drinking water lead exposure. EPA agrees with commenters who support the fifth liter sample option for locations with LSLs. EPA has determined that in locations with LSLs, first liter samples can underestimate system lead levels compared to a fifth liter sample. Such underestimation of system lead levels based on first-draw sampling could allow water systems to be unaware that their corrosion control treatment is not working well (Lytle et al., 2019). Without appropriate awareness from tap sampling, systems will not take actions to reduce lead exposure and communicate lead in drinking water risks to consumers.

Numerous studies have evaluated the contribution of lead in drinking water from different sources (*e.g.,* service lines, faucets, meters). A study published by American Water Works Association (AWWA) Water Research Foundation (2008) ''Contributions of Service Line and Plumbing Fixtures to Lead and Copper Rule Compliance Issues'' (Sandvig et al., 2008) estimates that 50 percent to 75 percent of lead in drinking water comes from LSLs. Thus, when present, LSLs are the greatest contributor of lead in a home's drinking water. Research using sequential tap sample collection techniques on homes with LSLs indicates that a first draw sample may not represent the significant contributions of LSLs to a home's drinking water lead levels (Lytle et al., 2019). Therefore, relying on first liter samples for lead could allow a situation in which there may be high lead levels in a system but a 90th percentile concentration below the trigger level or action level.

Given that LSLs are the greatest contributor of lead in drinking water, EPA reviewed the sampling data in the AwwaRF, 2008, Del Toral, 2013, and Lytle et al., 2019 studies to determine the liter in any given sequential sampling profile that was most likely to contain the water that remained stagnant within a customer-owned LSL. Based on this information, EPA selected the fifth liter as the most likely to capture this water and any elevated levels of lead. Additionally, the fifth liter is more likely to capture the water from the customer-owned portion of the service line, which may remain in place from partial LSLRs conducted by systems under the previous rule. The first draw sample represents water that has traveled through the service line but that has sat in contact with the plumbing materials inside the home prior to the tap for the stagnation period. The first draw is an effective sampling technique to identify lead corrosion from taps, solder, pipes and fittings within the home but is not an effective sampling approach to capture corrosion from LSLs. Therefore, the final LCRR requires systems to collect fifth liter samples at LSL sites because the data gathered from fifth liter samples to calculate the 90th percentile is a better indicator of the effectiveness of corrosion control treatment in a system.

EPA finds that requiring the fifth liter sample for tap sampling would be more representative of lead concentrations in service lines than the first liter sample, which will provide better information on the highest concentration of lead in the system's drinking water. This better information will more appropriately identify the need for required actions designed to reduce lead and copper exposure by ensuring effective CCT and re-optimization of CCT when water quality declines; enhancing water quality parameter (WQP) monitoring; implementing a ''find-and-fix'' process

to evaluate and remediate elevated lead at a site where the individual tap sample exceeds 15 µg/L; and making consumers aware of the presence of a LSL, if applicable, to facilitate replacement of LSLs.

EPA disagrees with commenters who stated that a fifth liter sample option is too complicated for samplers to perform. To address commenters' concern regarding the proposed fifth liter protocol, EPA modified it to no longer require the use of a gallon container as some customers may not be able to manage a gallon container of water. EPA also modified the protocol so that samplers collect five one liter bottles which allows for collection of a first liter for copper analysis and a fifth liter for lead analysis, thus reducing the potential need for two separate sampling events. Although there are additional steps in the fifth liter protocol for LSL sites, EPA will work with states and stakeholders to provide templates for sampling instructions that are clear and simple. Samplers will be able to collect samples in accordance to this new protocol with minimal error. The EPA disagrees with commenters who stated that the fifth liter sample option should not be required because it does not represent water that is typically consumed. The LCR tap sampling requirements are not intended to represent typical consumption; rather, the tap sampling is intended to determine the effectiveness of corrosion control treatment and to determine if additional actions are needed including LSLR to reduce drinking water exposure to lead.

EPA received many comments on the proposed tiering criteria for selection of tap sampling sites. Some commenters stated the proposed tiers were biasing samples against copper sites and suggested EPA should diversify tap sample sites. Other comments suggested the removal of Tier 2 sites altogether due to the difficulty of reaching this population to carry out the sampling. EPA disagrees with these comments because the changes in the tiering requirements are designed to increase the likelihood of collecting tap samples at sites expected to have elevated lead levels. Many commenters recommended EPA modify the tiers to consider sites with plumbing materials other than LSLs, such as galvanized pipes, lead goosenecks, and other lead fittings. Some of these comments raised concerns about water systems with few or no LSLs, but that have galvanized service lines impacted by lead, or lead goosenecks, pigtails, or connectors in their distribution system. Several comments supported the proposed tiering criteria, while others offered alternative approaches. EPA agrees that galvanized service lines impacted by lead, or lead goosenecks, pigtails, or connectors should be considered in the tiering criteria for selecting tap samples and has modified the final rule to reflect this.

Many commenters requested clarification on how the 90th percentile calculation should be performed when systems have a mix of Tier 1 through 4 sites. Commenters suggest that for systems with a mix of Tier 1 through 4 sites, they should not be permitted to ''dilute'' the sampling pool with Tier 4 sites if they have a sufficient number of Tier 3 sites, similar to how EPA proposed calculating the 90th percentile when there is a mix of Tier 1 and Tier 2 sites. EPA agrees and notes this is addressed in the regulatory text under § 141.86(a). For example, for a water system to use Tier 4 sites it must have an insufficient number of Tier 1 through 3 sites: A CWS with insufficient Tier 1, Tier 2, and Tier 3 sampling sites shall complete its sampling pool with ''Tier 4 sampling sites''.

Many commenters state that the rule does not capture worst-case scenario copper concentrations, since the proposed tiering criteria focus on high risk sites for lead. While EPA agrees more emphasis has been placed on LSL sites, water systems without LSLs will be focusing on sites with copper pipe with lead solder.

Several commenters asked that the method for calculating the 90th percentile in the current rule be maintained. A commenter noted how follow-up samples from find-and-fix are not included in the 90th percentile calculation and suggested that if the follow-up sample provides information confirming that the initial sample was taken in error, the initial sample result should not be used in the 90th percentile calculation Several commenters also requested clarification whether follow-up samples taken after a partial or full LSLR are included in the 90th percentile calculation. Some commenters disagree with this inclusion, stating it may deter water systems from carrying out replacement activities. EPA clarifies that follow-up samples collected under the find-and-fix provisions or after a LSLR are not included in the 90th percentile calculation but must be submitted to the state. The find-and-fix samples may be outside of the tap sampling monitoring period or collected using a different tap sample protocol.

EPA received many comments on the tap sampling protocol in the proposed LCRR. EPA proposed the use of wide-mouth collection bottles and the prohibition of flushing the taps prior to the 6-hour stagnation period and cleaning or removing tap aerators in anticipation of sampling. Many commenters supported these updated provisions, stating it will limit these practices which were altering sample results and could make them lower, while others disagreed with them, stating it will negatively impact lead results. In addition, some commenters explained that there is confusion when, in certain cases, customers should be flushing stagnant water out of taps or cleaning aerators to prevent lead exposure. EPA disagrees with commenters who were in favor of allowing pre-stagnation flushing in LCR tap sampling. Flushing, or running taps, has long been understood to decrease water lead levels in a home, and thus has been a recommendation by Federal, state, and local authorities as a way to reduce lead exposure prior to water use, especially in residences of higher risk (*e.g.,* houses containing LSLs) as well as a beneficial practice at homes that may have lead solder or faucets and fixtures that are not ''lead-free''. Flushing removes water that may be in contact with LSLs for extended periods of time, which is when lead typically leaches into drinking water (USEPA, 2016). As a general matter, EPA recommends consumers flush taps as a regular public health protective practice to reduce household exposure to lead in drinking water. However, in the case of collecting tap samples to determine whether corrosion control is effective or additional actions must be taken to reduce exposure, this practice may mask potential higher lead levels and is prohibited in this final rule. EPA also disagrees with commenters that supported removing and cleaning the faucet aerator prior to sampling. The taps used for monitoring likely contain an aerator as part of the faucet assembly, and particulate matter, including lead, may accumulate within these aerators. Thus, removing and/or cleaning these aerators just prior to sample collection could mask the contribution of particulate lead. It is advisable to regularly remove and clean faucet aerators to avoid particulate matter build-up. As a general matter, EPA recommends consumers clean faucet aerators as a regular public health protective practice to reduce household exposure to lead in drinking water. However, if customers only remove and clean the aerators before sample collection, the sample results will not be representative. Thus, EPA has prohibited the removal and/or cleaning

of the faucet aerator as part of the procedures for collection of lead and copper tap samples.

EPA did not propose revisions to the requirement that tap samples be taken after the water has stood motionless in the plumbing system for at least six hours. Some commenters asked that a maximum stagnation time also be included in the protocol to avoid situations where water has been stagnant for such an extended period of time (*i.e.,* vacation homes) that results would not be representative of regular use. EPA does not believe that a maximum stagnation period is necessary for the rule. Water systems can choose other sites from the same tier in the sample pool if they are aware that this is a problem. Therefore, EPA has not added a maximum stagnation time into the final rule requirements.

Several commenters suggested that EPA include alternative sampling techniques such as random-daytime sampling or using filters to measure the lead levels after water is used under normal circumstances for a specified period of time. EPA considered suggestions for other sampling methodologies such as random-daytime sampling. EPA disagrees with these commenters. EPA determined that first liter samples at non-LSL sites and the fifth liter at LSL sites are the most appropriate means to evaluate CCT for both lead and copper. Suggested methods such as random-daytime sampling are too complex for compliance sampling that is implemented by customers and would require an increased cost and burden to water systems. Random daytime sampling is a practice that collects samples at random locations in the distribution system at random times throughout the day. Lead levels vary significantly from location to location based upon differing plumbing materials. Lead levels also vary over time based upon water use at a location. The LCRR controls for these variables by tiering sampling locations to select sites with leaded plumbing materials and by requiring a stagnation period prior to collecting a sample. These protocols will assure that elevated lead levels will be found, if present, which enables the system to evaluate corrosion.

EPA proposed to expand to all systems the current LCR requirement applicable to most systems that change their source water or make a significant treatment change, to obtain approval from their primacy agency prior to making the change. EPA requested comment on whether the regulation should specify a minimum tap sampling frequency following the source water change or significant treatment change and if so, whether it should be annual or biannual tap sampling. EPA received substantial comments from this request. Some commenters asked EPA to define ''significant'' as this can include a wide range of changes, some of which may not warrant increased sampling requirements. They noted that there are several factors that come into play that should determine the appropriate tap sampling frequency following the change, factors include: Full water quality parameter sampling of the new source, applicable saturation indices results, current or proposed corrosion control treatment, blending with existing sources, size of system, and previous LCR tap sampling.

Some commenters expressed that this should be determined by the state based on these factors and the risk profile of the type of change proposed. Many commenters asked EPA to establish a minimum tap sampling frequency of every six months following these changes to fully account for the impact to water quality from the addition or change in source water or long term treatment while others stated annual monitoring would be appropriate because it is more feasible for water systems. Some requested six-month monitoring for new sources and annual monitoring for treatment changes. After a full evaluation of these comments, EPA has determined a minimum tap sampling frequency of once every six months following a change in source water or a significant treatment change is appropriate. Deterioration in water quality or unintended consequences of source water or treatment changes will be more quickly identified and therefore addressed when tap sampling occurs every six months. To provide additional clarification if a significant change would include any long-term change in treatment and the addition of a new source as specified in § 141.90(a)(3), which includes examples of long term treatment changes. States have the expertise to determine which changes qualify as significant to warrant standard 6-month monitoring.

EPA received comments on customer-requested tap sampling. Many commenters disagreed with including the results of this sampling in the 90th percentile. They state that EPA should provide clear guidance on how to discard these samples before including them in the calculation. However, other commenters mention how carrying out customer-requested tap sampling is positive and can empower customers to take action upon receipt of results. Others assert that when samples are taken upon customer request, they should be collected with the standard compliance protocol to standardize the sampling process, especially if they are included in the 90th percentile calculation. Some commenters asked how to include these samples in the compliance pool and whether they should be included only if they are sites served by an LSL. Some asked for clarification on customer-requested samples that are collected outside of the compliance period or not in accordance with the tap sampling compliance protocol. EPA agrees that samples taken upon customer-request should be used in the 90th percentile calculation only if they are from known LSL sites (or appropriate tier if no LSLs), collected during the tap sampling period, and use the appropriate tap sampling protocol. EPA encourages water systems to create and maintain a program for testing at residences where customers request it and to share the sampling results with customers.

3. Final Rule Requirements

The frequency of monitoring and number of samples to be collected and analyzed is based primarily on how many people the water system serves and previous tap water monitoring results. If residents are collecting tap samples, the water system must recruit volunteers at the sites that are most likely to have elevated lead based on the tiering criteria described in the section below.

To the extent feasible, water systems are required to use the same tap sample sites each monitoring period. If a resident decides to discontinue participation in tap sampling, the water system must select a similarly ''tiered'' site. Due to potential non-response from resident volunteers, EPA recommends including more sampling sites in the pool of targeted sampling sites than is required. The water system is required to calculate a 90th percentile of the sampling results from all sites separately for lead and copper at the end of each monitoring period. This 90th percentile value is reported to the state and used to determine whether the system must comply with other requirements of the rule, such as corrosion control treatment, source water monitoring, public education, and LSLR. Water systems with LSLs are required to collect samples from all LSL sites (Tier 1 and 2) unless there is an insufficient number to meet the minimum number of samples required. In those cases, the water system must use Tier 3, 4, or 5 sites, in that order.

In the final rule, EPA revised the tap sample tiering criteria to include 5 tiers for several reasons. First, this revision

ensures that priority is given to highest risk lead sources in the absence of LSLs; galvanized service lines that have been impacted by a lead source such as lead goosenecks, pigtails and connectors. Galvanized lines that are or were downstream of a lead source such as a LSL can contribute to lead in drinking water. These lines have zinc coating containing lead that can leach into drinking water when corroded. They also can capture lead from upstream lead sources and release lead if water quality changes or these pipes are disturbed. These sites have been designated as Tier 3. In this way, these materials are prioritized in tap sampling site selection and will be sampled for non-LSL systems that have these. In the final rule, Tier 4 sites will be comprised of single-family structures containing copper pipes with lead solder and Tier 5 sites are representative of sites throughout the distribution system. NTNCWSs must sample at sites with LSLs (Tier 1), unless they have insufficient numbers to meet the minimum requirement of sites, then they can choose from Tier 3 sites and then Tier 5 sites.

REVISED LEAD AND COPPER SITE SELECTION CRITERIA

Tier	CWS		NTNCWS	
	Proposed rule	Final rule	Proposed rule	Final rule
Tier 1	Collect samples from SFSs served by LSLs. Tier 1 samples can be collected from MFRs if they represent at least 20 percent of structures served by the water system.	Collect samples from SFSs served by LSLs. Tier 1 samples can be collected from MFRs if they represent at least 20 percent of structures served by the water system.	Collect samples from building served by LSL.	Collect samples from buildings served by LSL.
Tier 2	Collect samples from buildings and MFRs served by LSLs.	Collect samples from buildings and MFRs served by LSLs.	N/A	N/A.
Tier 3	Collect samples from SFSs with copper pipes with lead solder installed before *the effective date of the state's lead ban*.	Collect samples from SFSs with galvanized service lines downstream of an LSL, currently or in the past or known to be downstream of a lead connector.	Collect samples from buildings with copper pipe and lead solder installed before *the effective date of the state's lead ban*.	Collect samples from SFSs with galvanized service lines downstream of an LSL, currently or in the past or known to be downstream of a lead connector.
Tier 4	Representative sample where the plumbing is similar to that used at other sites served.	Collect samples from SFSs with copper pipes with lead solder installed before *the effective date of the state's lead ban*.	Representative sample where the plumbing is similar to that used at other sites served..	N/A.
Tier 5	N/A	Representative sample where the plumbing is similar to that used at other sites served.	N/A	Representative sample where the plumbing is similar to that used at other sites served.

Acronyms: CWS = community water system; LSL = lead service line; MFR = multi-family residence; N/A = not applicable; NTNCWS = non-transient non-community water system; SFS = single family structure.

In the final rule, EPA made significant changes to the tap sample collection protocol under § 141.86(b). For LSL sites, a first liter and a fifth liter must be collected and analyzed. The first liter analyzed for copper and the fifth liter for lead. Water systems without LSL sites must collect a first draw one-liter sample for analysis for lead and copper. The fifth liter protocol requirements are described in § 141.86(b). This change to the overall protocol from first draw to fifth liter sample will increase the likelihood that the highest levels of lead will be captured, and appropriately trigger systems into improved corrosion control treatment, LSLR and public education programs to reduce drinking water lead exposure. Only sites served by an LSL will collect a fifth liter for lead analysis. A first-draw sample will be retained for copper analysis at these sites. For sites not served by an LSL, a first-draw sample will be collected and analyzed for lead and/or copper depending on the water system's monitoring schedules for lead and copper.

EPA is finalizing the modifications to the tap sampling protocol regarding the removal and cleaning of aerators and pre-stagnation flushing in anticipations of sampling efforts. EPA is also promulgating the requirement that all tap samples be collected in wide-mouth sample bottles so that collection is occurring when the faucet is flowing at a high rate, typical of normal water use such as pouring a glass of water.

EPA added a requirement for tap sampling every six months following the addition of a new source water or a long-term change in treatment in the final rule unless the state determines that the addition of the new source or long term treatment change is not significant and therefore does not warrant more frequent monitoring. The new requirement is described in § 141.86(d)(2)(iv).

H. Water Quality Parameter Monitoring

1. Proposed Revisions

Under the current LCR, water systems that have CCT monitor water quality parameters (WQPs) to ensure effective CCT. WQP samples must be collected at taps every six months and at entry points to the distribution system every six months prior to CCT installation and every two weeks thereafter. EPA proposed several revisions to the WQP monitoring requirements. EPA proposed to eliminate calcium carbonate stabilization as a potential option for CCT and thus, to remove the WQPs associated directly with this CCT option (*e.g.,* all parameters related to calcium hardness (calcium, conductivity, and water temperature)).

EPA proposed additional WQP monitoring samples be collected by water systems that have CCT and that have any individual tap sample(s) with lead results exceeding 15 µg/L. The additional WQP monitoring is a part of proposed provisions for ''find-and-fix'' (see section III.K. of this preamble), which would require water systems to collect follow-up lead tap samples at every sampling site that has an individual lead sample greater than 15 µg/L within 30 days of obtaining results of the individual sample greater than 15 µg/L. EPA also proposed a WQP sample be collected at a location on the same size water main located within a half mile of the residence with the lead result greater than 15 µg/L. This WQP monitoring was proposed to be completed within five days of receiving results of the individual lead sample greater than 15 µg/L. Water systems with existing distribution system WQP monitoring sites that meet the main size/proximity requirements could conduct the sampling at that location. EPA proposed that any water system which adds sites for the purposes of

WQP monitoring specified in this paragraph include those additional sites in future WQP monitoring.

EPA also proposed that both CCT and WQPs be assessed during sanitary surveys for water systems with CCT. EPA proposed that states conduct a periodic review of WQP results and other data to ensure the water system is maintaining the optimal CCT and to assess if there should be modifications to the CCT to further reduce lead and copper levels in tap samples.

In addition to the updates for WQP requirements previously specified, EPA proposed several supplementary changes to the current rule. EPA also proposed revisions to the requirements for water systems to reduce the number of sites sampled and the frequency of WQP sampling. As a prerequisite to reducing the number of sites used in water quality parameter monitoring, the current rule requires the water system to maintain the range of water quality parameters for two 6-month monitoring periods. EPA proposed that water systems would also need to meet the lead 90th percentile trigger level for those two 6-month monitoring periods to be eligible for a reduction in the number of sites for WQP sampling. As a prerequisite to reducing the frequency of monitoring for water quality parameters, under the current rule, the water system must maintain the range of WQP values for three consecutive years to reduce to annual monitoring. Under the proposal, the water system would need to also meet the lead 90th percentile trigger level for those three consecutive years in order to be eligible for yearly monitoring. Under the current rule, if the water system meets the WQP requirements determined by the state and the lead 90th percentile trigger level for three additional annual monitoring periods, it may reduce its WQP monitoring frequency to once every three years. EPA also proposed that for every phase of potential reduced WQP monitoring (*i.e.,* semi-annual, annual and triennial), the water system would also be required to meet the lead trigger levels. This would ensure that the required WQP monitoring sites and frequency continue when water systems have high lead levels. For a water system on reduced monitoring, EPA proposed that grandfathered data may be used if collected in accordance with the proposed revisions and its 90th percentile in either grandfathered data or initial tap sampling is at or below the trigger level.

2. Public Comments and EPA Response

As noted in Section III.B, EPA received mixed comments on its proposal to delete calcium carbonate stabilization as a mandatory corrosion control treatment and the removal of calcium, temperature, and conductivity as mandatory water quality parameters when it was selected as the corrosion control treatment. EPA has removed calcium carbonate stabilization and its associated unique water quality parameters from the final rule as options for systems that are optimizing or re-optimizing CCT. However, for systems that have previously been deemed optimized using this treatment approach, the key water quality parameters of pH and alkalinity are being maintained in the final rule and states will be allowed to designate additional water quality parameters to reflect optimal corrosion control (provided the system does not exceed the trigger level or action level).

EPA received many comments about the number of water quality parameter sites that could be added as a result of the proposed find-and-fix requirements. Commenters expressed concern that added WQP sites could not be removed and could over time become too numerous. The systems that will be subject to optimal water quality parameter monitoring are all large systems, medium systems that continue to exceed an action level, and small systems that exceed an action level and have selected optimal corrosion control treatment under the small system flexibility. EPA agrees with commenters that suggested there should be a limit on the number of water quality parameter locations that may be added and has determined the maximum sites should be two times the standard number of water quality parameter sites. EPA determined that this is a sufficient number of sites to ensure water quality. When a system exceeds this upper threshold for the number of sites, the State has discretion to switch out sites that have been added if the newer site can better assess the effectiveness of the corrosion control treatment and to remove sites during sanitary survey evaluation of OCCT.

Several commenters stressed that the final rule should require all systems to conduct regular monitoring of the optimal water quality parameters. EPA agrees with these commenters that triennial monitoring does not provide enough data on water quality in the distribution system. Significant changes in distribution system water quality can occur over a three-year period and water systems need to conduct more frequent WQP sampling to assure CCT is being effectively maintained.

3. Final Rule Requirements

The final rule includes the proposed revision to the WQP monitoring requirements with two modifications. Section 141.82(j)(1)(vi) of the final rule limits the number of WQP sites that must be added through the find-and-fix process to two times the standard number of WQP sites. The final rule allows states to determine which sites will be retained if a system exceeds the find-and-fix threshold of two times the standard number of water quality parameter sites. This is summarized in the table below.

NUMBER OF WATER QUALITY PARAMETER SITES IN DISTRIBUTION SYSTEM

System size (number people served)	Standard monitoring (number WQP sites)	Reduced monitoring (number WQP sites)	Find-and-fix threshold (number WQP sites)
>100,000	25	10	50
10,001–100,000	10	7	20
3,301–10,000	3	3	6
501–3,300	2	2	4
101–500	1	1	2
≤100	1	1	2

As an example, if a system that serves more than 100,000 persons reached the find-and-fix threshold of 50 water quality parameter locations, the state has the discretion to determine which added find-and-fix sites to retain if new locations are needed to assess corrosion control treatment. States have the flexibility to decide that it is necessary

to retain all the WQP sites and exceed the find-and-fix maximum if it deems it necessary to demonstrate optimal corrosion control treatment.

Second, the final rule requires all WQP locations to be sampled at least annually and specifies that samples should be taken throughout the monitoring period to reflect seasonal variability and triennial monitoring does not provide sufficient data.

I. Source Water Monitoring

1. Proposed Revisions

The 1991 LCR required water systems to conduct source water monitoring following an action level exceedance. Based on the results of the source water monitoring, the state must decide whether it is necessary for the water system to install source water treatment to reduce lead and/or copper tap levels. Regardless of whether a state decides that treatment is needed or not, the water system is still required to conduct source water monitoring following the state decision. EPA proposed to discontinue additional source water monitoring requirements if (a) a water system has conducted source water monitoring for a prior lead and/or copper action level exceedance, (b) the state has determined that source water treatment is not required, and (c) a water system has not added any new water source(s).

EPA proposed these changes to eliminate monitoring requirements that are not necessary to protect public health. Lead and copper are rarely found in the source water in significant quantities (Chin, D., Karalekas, P.C.J., 1985; USEPA, 1988; USEPA, 1990b); thus, where the state has decided that source water treatment is not needed, EPA proposed to allow the state to waive source water monitoring for any subsequent action level exceedance under the conditions listed above and to eliminate the regular monitoring currently required for source water lead and copper.

2. Public Comment and EPA's Response

Several commenters expressed support for waiving source water monitoring as outlined in the proposed LCRR. One commenter specifically expressed support for source water monitoring waivers to be issued by the state in the case of subsequent action level exceedances as outlined in the proposed LCRR. Other commenters opposed the waiver, citing lack of public access to data that lead can occur naturally in source water in some geologic settings, and that they have ''more than a dozen public water systems that treat for naturally occurring, elemental lead found in their source water and even more systems with low levels of lead that do not require treatment.'' The Agency does not dispute that lead may be found in source water in certain geologic settings; however, the final LCRR requires that any system which adds a new source shall collect an additional source water sample from each entry point to the distribution system during two consecutive six-month monitoring periods until the system demonstrates that drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the state. EPA disagrees that source water monitoring results should be made publicly available because source water sampling results are not representative of water quality at the tap.

3. Final Rule Revisions

The final LCRR eliminates source water lead and copper monitoring that is not necessary to protect public health. Lead and copper are rarely found in the source water in significant quantities (Chin, D., Karalekas, P.C.J., 1985; USEPA, 1988; USEPA, 1990b); thus, where the state has decided that source water treatment is not needed, the state may waive source water monitoring for any subsequent action level exceedance under certain conditions. The final LCRR includes the provision for discontinued additional source water monitoring requirements if (a) a water system has conducted source water monitoring for a prior lead and/or copper action level exceedance, (b) the state has determined that source water treatment is not required, and (c) a water system has not added any new water source(s).

J. Public Education and Sampling at Schools and Child Care Facilities

1. Proposed Requirements

EPA proposed a new requirement for all CWSs to sample for lead at schools and child care facilities they serve and to provide public education for those facilities. The intent of the requirement is to inform and educate targeted CWS customers and users about risks for lead in premise plumbing at schools and child care facilities since large buildings, such as schools, can have higher potential for elevated lead levels due to complex premise plumbing and inconsistent water use patterns. While schools are not likely to be served by LSLs, they may have lead in premise plumbing; therefore, EPA proposed these requirements because public education and water system sampling would provide schools and child care facilities with assurance in the process and benefits of managing a drinking water testing program and the information necessary for them to take actions to reduce lead risk. While, prior to this rule, EPA did not require public water systems to conduct sampling in schools and child care facilities, the Agency had established a voluntary program: 3Ts for Reducing Lead in Drinking Water in Schools and Child Care Facilities—A Training, Testing and Taking Action Approach (3Ts) (EPA–815–B–18–007). The purpose of this program is to assist states, schools, and child care facilities with conducting their own testing programs, conducting outreach, and taking action to address elevated levels of lead. Some states and localities have established mandatory and voluntary programs to test for lead in schools and child care facilities. However, many schools and child care facilities have not been tested for lead. A 2018 survey by the Government Accountability Office (GAO) found that 41 percent of school districts had not tested for lead and an additional 16 percent did not know if they had been tested (GAO, 2018).

EPA proposed these requirements because students and young children are especially vulnerable to lead exposure and spend a large portion of their day in schools and child care facilities. Lead in drinking water can be a significant contributor to overall exposure to lead, particularly for infants whose diets often include foods or formula made with water from public water systems (*i.e.,* baby food, juice, or formula). Young children and infants are particularly vulnerable to lead because the physical and behavioral effects of lead occur at lower exposure levels in children than in adults. In children, low levels of exposure have been linked to damage to the central and peripheral nervous system, learning disabilities, shorter stature, impaired hearing, and impaired formation and function of blood cells.

Children spend on average over six hours per day at school ((U.S. Department of Agriculture (USDA) National Center for Education Statistics), with many spending more time at on-site before- or after-school care or activities. Children consume water in these facilities through drinking and as part of food preparation. Across the country, about 100,000 schools participate in the national school lunch program, serving daily lunch to approximately 30 million students (USDA, National School Lunch

Program, 2019). Ninety thousand schools serve breakfast to 14.8 million students every day (USDA). The Healthy, Hunger-Free Kids Act of 2010 (HHFKA), which authorizes funding and sets policy for USDA's child nutrition programs, requires schools participating in federally funded meal programs to make water available during meal periods at no cost to students (section 202 of HHFKA (42 U.S.C. 1758(a)(2)(A))). The Act also mandates that child care facilities provide free drinking water throughout the day (section 221 of HHFKA (42 U.S.C. 1766 (u)(2))). The combination of potential higher lead levels in large buildings, vulnerability of children to lead, and the length of time spent at schools and child care facilities presents lead risks to children that can be mitigated through public education, sampling, and voluntary remediation actions.

Furthermore, the requirement for water systems to conduct sampling at schools and child care facilities provides an added measure of protection, above the other elements of the treatment technique rule, in light of the vulnerabilities of the population served and the potential variability of lead levels within the system and within a school or child care facility over time. Large buildings such as schools can have a higher potential for elevated lead levels because, even when served by a water system with well operated OCCT, there may be longer periods of stagnation due to complex premise plumbing systems and inconsistent water use patterns. In such situations, there may not be technical improvements that can be made to the OCCT. However, risk can be mitigated through public education and voluntary remediation actions such as replacement of premise plumbing. Water systems have developed the technical capacity to conduct sampling for lead in operating their system and complying with current drinking water standards.

EPA proposed that the CWS be required to provide information about the health risks and sources of lead in drinking water and collect samples from five drinking water outlets at each school and two drinking water outlets at each child care facility within its distribution system once every five years. It would share results with the facility, local and state health departments, and the state primacy agency. Samples would be first draw after at least 8-hours but not more than 18-hours stagnation in the building and be 250 ml in volume. EPA proposed this sampling protocol to be consistent with the recommended sampling protocols under the Agency's 3Ts Toolkit. The smaller sample size is more representative of the amount of water consumed per serving and the stagnation time is representative of daily water use within these facilities. These samples would serve as a preliminary screen for lead risks within the facility and are not necessarily representative of lead levels in other outlets.

EPA proposed that the CWS compile a list of schools and child care facilities served by the water system to conduct outreach and sampling, including distributing the 3Ts for Reducing Lead in Drinking Water Toolkit (EPA–815–B–18–007), or subsequent guidance issued by EPA that provides information on identifying lead risks, follow-up sampling procedures, stakeholder communication, and remediation options. A CWS's distribution of the 3Ts would initiate or contribute to active communication with schools and child care facilities, who are critical customers that serve a vulnerable population. EPA also proposed that the CWS provide results to schools and child care facilities, the drinking water primacy agency, and the local and state health department where the facility is located no more than 30 days after receipt of results. The results of the samples would not be used as part of the CWS's calculation of the 90th percentile value because these samples are being collected in a manner to inform whether action is needed at a specific school or child care facility and not whether corrosion control is effective system-wide. EPA did not propose requirements for CWSs to take remediation actions at facilities following the sampling and notification requirements. The managers of these facilities have established lines of communication with the occupants of these buildings (and their parents or guardians) and have control over routine maintenance and plumbing materials that may need to be addressed. The managers of the schools and child care centers can use the sampling results and the 3Ts to make decisions about additional voluntary actions to reduce lead risks in their facilities, including implementing their own 3Ts program.

EPA proposed a process for a water system to opt out of the sampling requirements. In the preamble, EPA described a process for a state or primacy agency to waive these requirements for individual CWSs to avoid duplication of effort with existing drinking water testing requirements in schools and child care facilities. EPA proposed that if a state has a program that requires schools and child care facilities to be sampled in a manner consistent with the proposed requirements, the state may use that program in lieu of the proposed requirements.

2. Public Comments and EPA's Response

EPA requested comment on an alternative to the proposed requirements for public education and sampling at schools and child care facilities described in this section. Under the proposed alternative, a CWS would be required to conduct annual outreach to school and child care facilities about the health risks and source of lead and drinking water, and would test at school and child care facilities as described in the proposal only when requested by a facility in their service area. Under this alternative, EPA assumed that 5 percent of schools and child care facilities in a water system service area would request testing per year (see Economic Analysis Chapter 5, section 5.3.2.5 for additional detail).

EPA received many comments on the proposed school and child care sampling requirements spanning a variety of topics. These included comments on the proposed and alternative options, requests for clarification on aspects of the requirements that relate to CWS compliance, the required number of samples, requests for exemptions, and comments on waivers for existing sampling programs.

EPA specifically asked for public comment on the proposed option that CWSs be required to sample for lead in school and child care facilities once every five years or if CWSs should be required to sample in facilities on request only. Some commenters supported the proposed requirements citing the importance of testing in these facilities, while others supported the alternative option citing the benefits of providing public education materials to interested schools and child care facilities and reduced burden to CWSs. Conversely, some commenters objected to the alternative proposal citing concerns that facilities may not request testing due to lack of knowledge about lead risks, the importance for testing for lead, or fear of testing results. Some commenters also argued that the requirements should be removed from the final rule stating that CWSs should not be the entity responsible for testing in schools and child care facilities and citing concerns about costs and resources, while others argued that the proposed requirements would not provide benefits to schools or child care

facilities. A few commenters also stated that sampling of school or child care facilities would be more effective if led by the Department of Education or the Department of Health and Human Services.

Based upon comments, EPA has decided to combine the proposed and alternative options by incorporating both mandatory and on request sampling into the final rule. CWSs must conduct sampling in elementary schools and child care facilities as described in the proposed requirements for one sampling cycle (5 years) and will offer sampling to secondary schools on request. After the first cycle is complete, CWSs must continue to conduct outreach to schools and child care facilities and must sample at the request of a facility. These requirements are intended to educate schools and child care facilities about the risks of lead in drinking water and inform them of ways to mitigate lead risks. The initial sampling accompanied by continued lead in drinking water outreach will provide elementary schools and child care facilities with an understanding of how to create and manage a drinking water testing program that is customizable to their needs and an appreciation of the benefits of such a program. The cycle of sampling is intended to reinforce the importance and benefits of lead testing in elementary schools and child care facilities. Children under the age of 7 are at the greatest risk of drinking water lead exposure, and prioritizing sampling in those facilities with the greatest risks will reduce burden on CWSs and will enable them to focus upon those schools and child care facilities with the most susceptible populations. This construct will also allow CWSs, following the initial cycle of sampling, to focus resources on sampling in schools and child care facilities that request assistance. EPA anticipates that after the first sampling cycle, elementary schools and child care facilities will better understand the process and benefits of lead testing and be more likely to implement their own 3Ts programs. However, facilities interested in further assistance will have the opportunity to be tested for lead by the CWS on request prompted through annual outreach. CWSs will not be required to sample more than 20 percent of the schools and child care facilities they serve in a given year.

EPA disagrees that the requirements for testing in schools and child care facilities should be removed from the final rule or that the requirements provide no benefits. Individual outlets, such as water fountains, can leach lead even when a water system has OCCT. The requirements are part of a targeted public education effort to educate schools and child care facilities and their users of the risks from lead in premise plumbing, the importance of testing for lead in drinking water, and to help them make decisions to mitigate lead risks. The requirement for CWSs to conduct sampling and public education for this vulnerable subset of consumers is within EPA's authority to promulgate a treatment technique rule to ''prevent known or anticipated adverse effects on the health of persons to the extent feasible'' (SDWA 1412(b)(7)(A)). School and child care facility sampling contributes to increased public awareness of the potential for elevated levels of lead in premise plumbing independent of a water system's 90th percentile value. EPA also anticipates that increased familiarity with the 3Ts will assist facilities in taking steps to reduce lead risks to vulnerable populations.

EPA also disagrees that the requirements would be more effective if led by another Federal agency. Few existing mandatory and voluntary programs are administered by state or local departments of education (Cradock et al., 2019). EPA notes that the Department of Education and the Department Health and Human Services are signatories to the 2019 *Memorandum of Understanding (MOU) on Reducing Lead Levels in Schools and Child Care Facilities* along with other Federal partners and organizations. The signatories to the MOU agree to work together to encourage schools and child care facilities to take actions to address lead in their facilities. This includes testing for lead in drinking water, disseminating results, and taking corrective actions. EPA intends for the requirements to complement these efforts and not replace ongoing initiatives to address lead risks in schools and child care facilities. EPA concluded that CWSs have the technical expertise to assist in schools and child care facilities in drinking water testing.

EPA also received many comments requesting clarification on achieving CWS compliance. Some commenters suggested that a CWS would be in violation of the proposed requirements if a school or child care facility did not respond to outreach for testing. Similarly, commenters suggested that meeting the requirement to sample in 20 percent of schools and 20 percent of child care facilities per year depended on facilities responding to CWS outreach. Some commenters cited these concerns as a rationale for supporting the alternative on request option. EPA notes that some schools and child care facilities may not respond to CWS outreach, meaning a CWS would not be able to obtain a refusal. EPA agrees that further clarification was needed and revised § 141.92(a)(3) to document a non-response after a CWS has made two separate good faith attempts to reach the facility. EPA also clarified in § 141.92(c) that non-responses and refusals may be accounted for in the annual 20 percent testing requirement for elementary schools and child care facilities during the mandatory sampling.

Some commenters suggested that the sampling requirements be expanded to include more samples per facility and more frequent sampling. Commenters argued that limited sampling may fail to detect elevated lead levels and some schools and child care facilities may infer from results that there is no lead risk. Other commenters noted that some schools and child care facilities do not follow the 3Ts and may not conduct follow-up sampling or take remediation actions. Some commenters further suggested that the 3Ts Toolkit is not sufficient for addressing lead issues. EPA disagrees that sampling requirements be expanded, as the intent is to provide a preliminary screen for lead in schools and child care facilities and an improved understanding of the importance of lead testing, and is not a replacement for comprehensive testing as detailed in the 3Ts. EPA further disagrees with comments regarding the effectiveness of the 3Ts. The GAO indicated in a 2018 report that 60 percent of school districts were not familiar with the 3Ts guidance, but for those that were, 68 percent reported finding the guidance helpful in reducing lead risks in their facilities (GAO, 2018). Requiring distribution of the 3Ts along with testing results is intended to both increase awareness of the need for lead testing and provide schools and child care facilities with information and tools they can use to reduce lead risks in their drinking water.

Conversely, some commenters suggested that facilities be exempted from testing based on construction dates (*e.g.,* 1986 ban on lead solder) or that repeat testing is not necessary if a facility is tested once, or all outlets are tested once, and results show no or low lead levels. The proposed requirements exempt CWSs from sampling in schools and child care facilities constructed after 2014 (consistent with Section 1417 of the SDWA), as these facilities will have been constructed with lead free plumbing components. Prior to the amendment of Section 1417 of the SDWA by the Reduction of Lead in Drinking Water Act, fixtures could

contain up to 8 percent of lead by weighted average and be classified as lead free. Changing the exemption date to 1986 would therefore be less protective of public health. EPA also disagrees with allowing exemptions based on previous low and non-detected lead levels. Lead levels at an outlet or within a building have been shown to vary over time, with lead levels at one outlet not necessarily characterizing lead levels at other others in the building. Therefore, exempting water systems from testing in facilities based on the previous results of samples taken at a limited number of outlets is not appropriate.

EPA received many comments on the alternative school and child care sampling programs in § 141.92(d). Commenters noted an inconsistency between the preamble in the November 2019 notice, which described the state providing waivers to CWSs where existing school and child care sampling requirements are at least as stringent as § 141.92, and the proposed requirement which stated ''the water system may execute that program [existing state or local regulations] to comply with the requirements of this section,'' implying a different mechanism. As noted above, EPA recognizes this inconsistency and has updated § 141.92(d) to describe the conditions by which a state may issue a full or partial waiver to CWSs. In addition, commenters encouraged EPA to accommodate sampling protocols of existing state and local programs, stating that programs using different stagnation times or sample volumes should not be excluded if they require more sampling more outlets more frequently and include remediation activities. EPA agrees that there are a variety of programs that may differ from the proposed requirements but may otherwise be sufficient or more comprehensive. In response, the final rule provides additional flexibility for existing programs to reduce duplicative testing by CWSs.

3. Final Rule Requirements

EPA is requiring CWSs to sample for lead in the elementary schools and child care facilities they serve once during the first five years after the compliance date for the final rule, and to sample for lead in the secondary schools they serve on request. After all elementary schools and child care facilities are tested once, the CWS will be required to conduct sampling at all the schools and child care facilities they serve when requested by a facility. EPA is retaining the exemption for schools and child care facilities constructed after January 1, 2014. However, in response to public comment, EPA has revised this exemption to include facilities built after the date of state adopted standards that meet the definition of lead free in accordance with Section 1417 of the SDWA, as amended by the Reduction of Lead in Drinking Water Act, to account for localities that adopted lead free standards earlier than 2014. These requirements apply to all CWSs regardless if they receive water from a wholesale system.

EPA is retaining the proposed requirement that all CWSs compile a list of schools and licensed child care facilities served by the system to conduct public education outreach and sampling. EPA notes that pursuant to § 141 90(i)(1)(i), the CWS shall use a good faith effort to identify facilities in their service area, such as reviewing water system billing and other records to identify service connections for schools and child care facilities and by requesting information from appropriate state agencies. During the first five years after the rule compliance date, the CWS is required to contact the elementary schools and child care facilities identified and provide them information about health risks of lead in drinking water at least annually, schedule sampling, and provide the 3Ts Toolkit (or subsequent EPA guidance). The CWS must also contact the secondary schools identified in the list at least annually and provide them with health information, and information on how to request sampling. As the list is updated, new schools and child care facilities will be identified and included in the annual outreach. In the first cycle of sampling, an elementary school or child care facility may decline or not respond to sampling. In response to comments, EPA has revised the requirement to allow the CWS to document non-responses in addition to refusals.

The CWS is required to contact 20 percent of elementary schools and 20 percent of child care facilities per year such that all facilities are sampled once (over the 5 years). In response to comments on flexibility, the final rule will allow an alternative schedule to be approved by the state, as long as all elementary schools and child care facilities are sampled once within a 5-year period. EPA has also clarified that non-responses and refusals may be accounted for in the 20 percent testing rate. CWSs are also required to sample secondary schools at the request of the facility during the 5-year period of mandatory sampling for elementary schools and child care facilities. If a CWS receives requests from more than 20 percent of the secondary schools it serves during a year, it may defer additional requests to the following year. A CWS is not required to conduct sampling in more than 20 percent of the secondary schools it serves in any year during the cycle of mandatory sampling for elementary schools and child care facilities.

Once the CWS has completed the requirements for all elementary schools and child care facilities once, EPA is requiring the CWS to sample both elementary and secondary schools and child care facilities on request. When offering sampling on request, the CWS shall continue to distribute annual information on the health risks of lead in drinking water and is required to provide annual information to schools and child care facilities about the opportunity to request sampling. At least 30 days prior to sampling, the CWS must provide instructions to facilities on how to identify outlets for sampling. If the CWS receives requests from more than 20 percent of the schools and 20 percent of the child care facilities it serves in a given year, the CWS may defer additional requests to the following year. The CWS is not required to complete sampling in more than 20 percent of the schools and 20 percent of the child care facilities it serves in a given year, and may sample the other facilities in the following year. The CWS is also not required to sample any individual school or child care facility more than once every five years. While not required, EPA recommends that CWSs consider factors such as age of students, building construction date, socioeconomic indicators, presence of LSLs, and Federal funding through Title 1 (20 U.S.C. 6301 *et seq.*) and Head Start (42 U.S.C. 9801 *et seq.*) to prioritize sampling in facilities that serve vulnerable or disadvantaged populations.

EPA is retaining the sampling protocol and the provisions to provide sample results to schools and child care facilities along with remediation information within 30 days of receipt of results. EPA has clarified that the remediation information is detailed in the 3Ts. Schools and child care facilities are encouraged to use the testing results and 3Ts Toolkit to inform follow-up activities and remediation actions. For consistency across other reporting requirements, the final rule includes provisions for CWSs to report all results to the primacy agency and local and state health departments as part of annual reporting.

EPA is retaining the proposed process for a state to waive school and child care facility sampling requirements for individual CWSs to avoid duplication of effort and has clarified this in the final

rule. During the cycle of mandatory sampling in elementary schools and child care facilities, a state may issue a CWS a written waiver if there is a state or local program to sample for lead in drinking water at schools or child care facilities that meets the requirements of this rule. This also may include schools or child care facilities that are sampling for lead through facility or district policy. If the sampling meets the final rule requirements, with the exception of stagnation time and sample volume, a waiver may be granted if remediation actions are required as part of the program. Likewise, programs with less frequent sampling (*e.g.,* every six years) that sample more outlets and require remediation, will meet the requirements for a waiver. A state may also issue waivers for voluntary sampling programs that meet the requirements for CWSs to offer sampling on request to secondary schools during the cycle of mandatory sampling in elementary schools and child care facilities, and to all schools and child care facilities thereafter. Some mandatory and voluntary programs are or have previously been funded, wholly or in part, under grant programs for school and child care testing established by the WIIN Act. Therefore, waivers may also be granted if sampling is conducted in accordance with a grant awarded under Section 1464(d) of the SDWA. A state may not issue a waiver to extend past the time period covered by the mandatory or voluntary program.

If a program is limited to a subset of schools and child care facilities defined in § 141.92(a)(1) of this final rule, a state may issue a partial waiver. For example, if a state has a required program for testing lead in drinking water in both elementary and secondary public schools but not in other types of schools or child care facilities, then a CWS serving only public schools can receive a full waiver. If a CWS serves both public and non-public schools and child care facilities, then the CWS would be required to notify and sample at the non-public schools and child care facilities and could receive a partial waiver to acknowledge that the CWS is not responsible for sampling in public schools. A state may issue full or partial waivers for existing voluntary programs. For example, if a state agency offers testing to all public schools when requested, the state could grant a partial waiver such that a CWS would not be required to offer sampling to public secondary schools in its service area during the time the CWS is conducting mandatory sampling in elementary schools and child care facilities. When the CWS is offering sampling on request to all schools and child care facilities, a state could then grant a waiver such that the CWS would not be required to offer sampling to the elementary and secondary public schools in its service area for the duration of the voluntary program.

K. Find-and-Fix

1. Proposed Revisions

EPA proposed a ''find-and-fix'' approach that would require water systems to perform additional actions when an individual tap sample exceeds 15 µg/L. Water systems would be required to collect a follow-up sample for each tap sample site that exceeded 15 µg/L within 30 days of receiving the tap sample result. The results of these ''find-and-fix'' follow-up samples would be submitted to the state but would not be included in the system's 90th percentile calculation because multiple investigatory samples at locations with high lead levels would bias results. If the water system is unable to collect a follow-up sample at a site, the water system would have to provide documentation to the state for why it was unable to collect a follow-up sample. The water system would be required to provide the follow-up tap sample results to consumers within 30 days of receiving the result (consistent with the current rule), unless that follow-up sample also exceeds 15 µg/L, in which case, EPA proposed the water system must notify the consumer within 24 hours of learning of the result. EPA proposed that water systems with CCT that have an individual tap sample that exceeds the lead action level, would be required to collect an additional WQP sample within five days of obtaining the lead tap sample result. For a CWS, this WQP sample must be collected from a site in the same water pressure zone, on the same size or smaller water main within 0.5 miles of the residence with the tap sample exceeding the lead action level. Water systems with an existing WQP site that meets these criteria would be able to sample at that location.

Any water system that is unable to regain access to the same site to collect a follow-up tap sample may decide to sample at another site within close proximity of the original site and with similar structural characteristics.

EPA proposed that WQP samples be collected within 5 days, since WQP sites are more accessible sites and do not require coordination with customers. The proposal included requirements to sample WQPs as close to the lead tap sample site as possible so that the water quality will more closely match the conditions at the site that exceeded 15 µg/L. The intent of the proposed requirements for a follow-up tap sample collected for lead was to help the water system determine the potential source of lead contamination (*e.g.,* premise plumbing, LSL) and the intent of the required WQP sample for water systems with CCT was to help determine if CCT is optimized, if additional WQP sites are needed, and/or if WQPs set by the state are being met. Such steps would help identify the source of the elevated lead to initiate appropriate mitigation. EPA proposed that when a water system is unable to identify and/or mitigate the risk, it must submit a justification to the state.

Under the proposal, the water system would be required to determine if problems with the CCT are leading to elevated levels of lead in the tap samples and then implement a mitigation strategy if necessary. In addition to the follow-up tap sample and the WQP sampling, the water system could review distribution system operations or other factors to determine the cause of the elevated lead level. CCT adjustment may not be necessary to address every exceedance. Water systems would note the cause of the elevated lead level if known in their recommendation to the state. Mitigation strategies could include a water system-wide adjustment to CCT, flushing portions of the distribution system, or other strategies to improve water quality management to reduce lead levels. Under this proposal, water systems would be required to confirm the find-and-fix steps were completed and recommend water system actions, such as spot flushing, to the state for approval within six months of the end of the monitoring period in which the site(s) first exceeded 15 µg/L and the state would have six months to approve the recommendation. EPA proposed implementation requirements for water systems that do not have CCT and recommends installation of it and for water systems with CCT that recommends re-optimization of CCT.

A water system may identify a fix that is out of its control. For example, if the source of lead in drinking water was an old faucet owned by the customer, and the customer did not wish to replace the faucet, the water system would provide documentation to the state under this proposal. All other fixes recommended by a water system would be implemented on a schedule specified by the state.

2. Public Comment and EPA's Response

EPA received a number of comments that expressed concerns that a single

elevated tap lead sample could trigger a system-wide corrosion control installation or re-optimization. One commenter stated that requiring the installation of corrosion control equipment for the entire utility if the cause of a sample exceedance is listed as corrosive water in one home, is excessive. Others commented that this provision is unwarranted, inappropriate, or a disproportionate response which could result in expensive and time-consuming distribution system evaluations. EPA disagrees that the find-and-fix provisions are unwarranted. These requirements initiate sampling and other activities that will assess the potential cause of the elevated levels of lead and will prompt additional feasible actions that will reduce the risks to persons at the locations where there may be elevated levels of lead. Many commented that corrosion control adjustments should only be made in response to data demonstrating that current corrosion control is deficient throughout the distribution system, and not in response to a small number of individual tap samples. Many commenters also interpreted the rule to require corrosion control treatment modifications to be the typical response to address a site that exceeded 15 µg/L. In response to these comments, the final rule emphasizes localized distribution system management as the likely fix. Mitigation strategies could include, flushing or other strategies to improve water quality management. However, in some instances where the find and fix corrosion control assessment monitoring finds that optimal water quality parameters are not being maintained in a portion of the distribution system, systems may need to implement localized or centralized adjustment of corrosion control treatment. A system that does not have existing corrosion control treatment is not required to conduct a corrosion control study or to install treatment as a result of find-and-fix unless the state determines it is necessary.

Some commenters noted that small water systems without corrosion control treatment may not be able to collect water quality parameter samples within five days as these systems may not have ready access to instruments and laboratories that can perform these analyses. EPA agrees and is allowing small water systems without corrosion control treatment up to 14 days to perform this monitoring. Many commenters also requested clarity on the purpose and location of the samples, with several interpreting the proposed rule as requiring the water quality parameter monitoring to be conducted at the site with the lead result above 15 µg/L. Many commenters also questioned the recommendation in the proposed rule to take a lead sample at a nearby site of similar plumbing characteristics, if the system was unable to take a follow-up sample at the site that was above 15 µg/L. EPA agrees that sampling at a different site in the vicinity will not help assess the lead source at the site that was above15 µg/L, so the final rule does not require systems to do this. If the water system is unable to collect a follow-up sample at a site, the water system must provide documentation to the State, explaining why it was unable to collect a follow-up sample. EPA also agrees that clarification is needed and has provide more details in the final rule of where and when follow up samples must be collected.

3. Final Rule Requirements

For the final rule, EPA is clarifying that the water quality parameter monitoring (Step 1) is intended to assess the corrosion control treatment at a nearby location in the distribution system and the follow-up sample at the tap sampling site above 15 µg/L (Step 2) is intended to identify the lead source at the site.

Step 1 of the process is the corrosion control assessment step in which water quality parameter sampling must be done within five days of the system receiving the tap sample results exceeding 15 µg/L, except for small water systems (serving 10,000 people or fewer persons) without corrosion control treatment that may perform the sampling within 14 days. The sampling is to replicate as closely as possible the water quality conditions at the time when the tap exceeded 15 µg/L. The water quality parameter sampling location is not at the tap that exceeded 15 µg/L but must be within the same pressure zone, on the same size main and within a half-mile from the tap sample site. Section 141.82(j)(1)(v) of this final rule allows systems with an existing WQP site that meets these criteria to sample at that site. Section 141.82.(j)(1)(vi) requires that a system that does not have an existing WQP site that meets the criteria to add the additional WQP site to its routine monitoring. Since the monthly total coliform sampling for large systems vastly exceeds the water quality parameter monitoring in the distribution system for the lead and copper rule, EPA expects coliform sampling locations should be available that are in the same pressure zone, on the same size main, and within a half mile of the site that exceeded 15 µg/L in many large systems. Medium-size systems may also find that total coliform sampling sites are available and can meet the criteria for sampling location when the existing water quality parameter sites are not located in that area of the distribution system. The maximum WQP sites that a system would have to sample are two times the standard number sites required. When a system exceeds this upper threshold for the number of sites, the state has discretion to determine if the newer sites can better assess the effectiveness of the corrosion control treatment and may remove existing WQP sites during sanitary survey evaluation of OCCT.

Step 2 is designated as site assessment in the final rule. In Step 2, water systems are required to conduct follow-up sampling at the tap sampling site above 15 µg/L. This is intended to help the system identify the source of the lead, such as the service line, brass faucet, lead solder, and/or gooseneck/pigtails, if possible. The final rule allows tap sample collection of a different volume or using a different protocol (if needed to better identify the source of lead) than samples collected under the tap monitoring and therefore the sample is not included in the 90th percentile calculation. If the water system is unable to carry out follow-up tap sampling (*i.e.,* the customer refuses a follow-up tap sample or there is a lack of response), the water system is responsible for documenting the reason for not carrying out the sampling. Water systems must note the cause of the elevated lead level, if known from the site assessment.

In Step 3, water systems evaluate the results of the monitoring from Steps 1 and 2 to determine if the cause of the lead tap sample above 15 µg/L is due to a source of lead at the sampling location, to corrosive water quality parameters or is unknown. If the water system determines the cause of the elevated level of lead is solely due to a source of lead at the sampling location, or is unknown, the system is not required to recommend an action to fix the cause of the elevated lead. If the water system finds that corrosive water quality parameters are the cause, the system must determine if distribution system management changes such as flushing to reduce water age or adjustment of the corrosion control treatment are necessary to restore optimal water quality parameters in that portion of the system. Adjustment of corrosion control treatment could include changing the feed rates for the corrosion inhibitor for a portion of the distribution system or for the entire

system to ensure that optimal water quality parameters are maintained for optimal corrosion control. The system must submit the recommendation to the state within six months after the end of the tap sampling period in which the site(s) exceeded 15 µg/L. Systems in the process of optimizing or re-optimizing optimal corrosion control treatment (§ 141.82(a)–(f)) do not need to submit a recommendation for find and fix as they are currently adjusting corrosion control treatment.

L. Water System Reporting Requirements

1. Proposed Revisions

EPA proposed changes to water system reporting requirements in conjunction with corresponding proposed changes to the regulatory requirements. These changes in reporting requirements were proposed to inform state decision-making and improve implementation and oversight.

In addition to the proposed tap sampling protocol revisions, EPA proposed that a water system would also be required to submit for state approval its tap sampling protocol that are provided to residents or individuals who are conducting tap sampling. The sampling protocol would be required to be written in accordance with new rule requirements. EPA proposed that the state would review the protocol to ensure that it does not include prohibited instructions for pre-stagnation flushing, and cleaning and/or removing the faucet aerator prior to sample collection and ensures the use of wide-mouth collection bottles. Under the proposal, water systems would also need to provide certification to the state that the approved sampling protocol has not been modified within 10 days of the end of the tap sampling monitoring period, and to submit an updated version if any modifications are made.

EPA also proposed to include new reporting requirements in conjunction with the revisions to the LSLR requirements in the final rule. By the rule's compliance date, the water system would be required to submit to the state an inventory of service lines. The water system would have to submit an updated inventory annually thereafter that reflects LSLs replaced and lead status unknown service lines that have been identified in the distribution system.

EPA also proposed that any water system with LSLs and 90th percentile tap sampling data that exceeds the lead trigger level would be required to annually certify to the state that it conducted notification in accordance with proposed LSL customer notification provisions. The notification would ensure customers were properly alerted about the trigger level exceedance, potential risks of lead in drinking water, and informed about the water system's goal based LSLR program.

In addition, under the proposal, a CWS must certify that it has completed the notification and sampling requirements at a minimum of 20 percent of schools and child care facilities served by the water system annually. The certification would include the number of schools and child care facilities served by the water system, the number of schools and child care facilities sampled in the calendar year, and the number of schools and child care facilities that have refused tap sampling. In addition, the proposal required that a CWS must certify that individual sampling results were shared with the respective school and child care facility, and with local or state health departments. If a CWS does not serve any school or licensed child care facilities, the water system would have to annually certify to the state that it made a good faith effort to identify schools and child care facilities and confirm that no schools or child care facilities are served by the water system. The good faith effort could include reviewing customer records and requesting lists of schools and child care facilities from the state or other licensing agency. Certification was to be sent to the state by July 1 of each year for the previous calendar year's activity.

EPA also proposed reporting requirements for small CWSs using the point-of-use compliance flexibility option. These systems would need to report their sampling results and corrective actions taken if a POU sample exceeded 10 µg occurred. In addition, they would certify the maintenance of the POUs if requested by the state.

Additionally, calcium results were no longer subject to reporting requirements under the proposed rule, because calcium was eliminated as a CCT option and thus not a regulated OWQP.

2. Public Comment and EPA's Response

EPA received many comments on the various reporting requirements. Many of the commenters expressed concern about the increased burden the proposed reporting requirements could impose and several offered suggestions such as an online tool, using existing opportunities such as sanitary surveys for reporting, or allowing the water system to self-certify instead of certifying that certain requirements are complete to the state. Commenters expressed that these burdens range from administrative to financial, and that small systems are likely to be impacted most. Some commenters argue against some of the reporting requirements to certify or re-submit material annually, stating that systems could track this on their own but provide to the state upon request. Many commenters were worried there would not be an adequate tracking tool or data system such as EPA's Safe Drinking Water Information System (SDWIS) to manage the reporting requirements of the proposal. Some commenters state that they would need to create tracking systems of their own and would need additional staff and data management systems. EPA agrees that new reporting requirements create a burden for water systems and states and has made changes to streamline reporting in the final rule as described below. EPA intends to support the data management needs of primacy agencies for the LCRR through the SDWIS Modernization development project, and to have a product available for state use by the compliance date of the LCRR. EPA will work closely with state program and information technology staff on LCRR database needs and on overall SDWIS modernization.

Regarding LSL reporting requirements, some commenters asked that reporting of updates to the service line inventory cease after all LSLs have been identified in the inventory as none would be installed in the future. EPA does not agree since updated inventories also reflect LSLR which include customer initiated and required LSLR following a trigger level and action level exceedance. The state needs to have this information to track compliance of LSLR requirements. Several commenters stated it is redundant to require water systems to submit a service line inventory and replacement plans after an action level exceedance because water systems are already submitting these. However, other commenters stated that LSLR plans should be submitted to the state regardless of the 90th percentile results. Based on commenter input, EPA has modified the requirement in the final rule; water systems will not be required to submit the inventory and replacement plans after an action level exceedance since they are submitted at the rule compliance date and updated inventories are submitted according to their tap sampling monitoring frequency (*i.e.,* annually or triennially) thereafter, thereby reducing the frequency of reporting inventory updates. In addition, there are off-ramps for

submitting inventory updates for those systems that can verify they no longer have LSLs, galvanized lines requiring replacement, or lead status unknown service lines in their distribution.

Some commenters requested that the final rule retain the reporting deadlines in the current rule. For instance, reporting lead and copper results within 10 days of the end of the tap sampling monitoring period instead of before the tap sampling period ends (for systems where the state calculates the 90th percentile) which was proposed. Many commenters had concern about the school and child care sampling and public education reporting requirements. Several commenters asked why after sampling results are reported, they also must be certified that they completed this requirement to the state. Several commenters offer suggestions on how to reduce the burden of these requirements or streamline them, such as submitting an annual report, or maintaining the records on hand and submitting upon request from the state. Many commenters had concerns about the number of attempts and documenting refusals when a facility simply does not respond. EPA has made changes to § 141.92(a)(3) regarding schools and child care facility refusals and nonresponse and the reporting § 141.90(i) so that CWSs certify once per year that they have met the schools and child care facility requirements for the previous calendar year. In addition, the annual certification is due July 1 of each year consistent with the timing for annual CCR certification.

Regarding the proposed reporting requirements for the ''find-and-fix'' provision, several commenters state it is impractical to maintain lists and tracking of all the ''fixes'' done by the water system and that this gives rise to privacy concerns for homeowners. Some commenters suggested a requirement for water systems to include ''find-and-fix'' activities in an annual or monthly report. Several commenters asked for guidance such as a template or checklist for the find-and-fix provisions states review. EPA evaluated public comments and agrees that clear steps, be included in the find-and-fix requirements and has made modifications to the final rule accordingly. This should also streamline find-and-fix reporting.

3. Final Rule Requirements

Many of the reporting requirements from the proposal have been retained in the final rule. However, EPA has taken into consideration all of the comments and has modified several sections to reduce burden, enhance efficiency of reporting and/or to include new necessary provisions. Many changes were made for clarification and organizational purposes in § 141.90, while others were made to reflect changes made to corresponding sections of the rule proposal.

The lead service line reporting requirements have been updated to allow systems to discontinue inventory updates when they no longer have service lines that need to be replaced or materials verified (*i.e.,* no remaining lead status unknown). In addition, the inventory requirements are now linked to the tap sampling monitoring schedules in § 141.86(d) to streamline dates for reporting. Also, systems must report annually that they completed any customer-initiated LSLR, in addition to requesting an extension to complete a customer-initiated LSLR.

The final rule clarifies that all water systems must report to the state an addition of a new source or long-term treatment change prior to adding the source or modifying treatment. In addition, this final rule includes a requirement for water systems to submit a tap site sample plan prior to the compliance date of the rule with tap sampling sites that meet the new site selection tiering criteria based on their LSL inventory to ensure states can verify the tap sampling sites comply with the requirements in the final rule and can track changes in the tap sampling pool.

Regarding reporting for small system compliance flexibility options, an additional reporting requirement was added for systems who have opted to remove lead-bearing plumbing from their distribution system; they must certify within one year that the material has been eliminated. Under reporting for schools and childcare facilities, EPA has made several changes, including reporting requirements for elementary and childcare facilities in the first five years of monitoring and reporting requirements for school and childcare sampling that is performed on-request.

IV. Other Revisions to 40 CFR Part 141

A. Consumer Confidence Report

In 1996, Congress amended the Safe Drinking Water Act (SDWA). Among other things, this amendment added a provision requiring that all CWSs deliver to their customers a water quality report annually called a Consumer Confidence Report (CCR). CCRs summarize information water systems collect to comply with regulations. The CCR includes information on source water, the levels of any detected contaminants, compliance with drinking water rules (including monitoring requirements), and some educational language, including a mandatory health effects statement regarding lead.

1. Proposed Revisions

As recommended by the NDWAC (see section VII.L.2 of this preamble), EPA consulted with risk communication experts to propose revised mandatory health effects language for the CCR. In addition, EPA proposed to use consistent mandatory lead health effects language in PE, CCR, and Public Notification materials. To improve clarity, EPA proposed to require CWSs to include a revised mandatory health effects statement that would inform consumers that lead is harmful for all age groups and to include a mandatory statement about LSLs (*e.g.,* their presence and how to replace them) for water systems with LSLs. The proposed statement is below.

Exposure to lead can cause serious health effects in all age groups. Infants and children who drink water containing lead could have decreases in IQ and attention span and increases in learning and behavior problems. Lead exposure among women who are pregnant increases prenatal risks. Lead exposure among women who later become pregnant has similar risks if lead stored in the mother's bones is released during pregnancy. Recent science suggests that adults who drink water containing lead have increased risks of heart disease, high blood pressure, kidney or nervous system problems. To increase transparency and improve public access to information, EPA also proposed to require CWSs to report the range of lead tap sample results in addition to the currently required 90th percentile and the number of samples that are greater than the lead action level for each monitoring period. Reporting the range of tap sample lead levels would allow consumers to understand how high tap sample levels were at individual sites.

2. Public Comment and EPA's Response

Several commenters suggested revisions to the informational health effects statement on lead in drinking water that would be required in the CCR to make the language more readable and useful to consumers. Some commenters recommended requiring the CCR to include information on LSLs and the LSL inventory, including the number of LSLs, the number of lead status unknown service lines, the total number of service lines in the water system, and a statement that a service line inventory has been prepared and is available for

review. They also recommended requiring the CCR to notify consumers that complete lead tap sampling data are available for review and how to access the data. EPA agrees this is important information to consumers and has incorporated these recommendations in the final rule requirements for the CCR.

A few commenters expressed concern that the CCR is no longer an effective method to communicate drinking water contaminant related issues and suggested use of other platforms such as social media. EPA supports using diverse methods of communication to reach consumers and provided recent guidance on electronic delivery of CCRs. In the final rule, EPA has increased the number and forms of public education materials. EPA has also worked to improve risk communication by consulting with risk communication experts, adopting clearer and more concise health effects language, and keeping the health effects language consistent across the CCR, 24 hour public notice for a lead action level exceedance, and all public education materials. In addition, the Agency has recommended that systems use social media to provide public education and outreach, for example to convey information about their LSLR program.

3. Final Revisions

EPA is finalizing the requirement for reporting tap sampling results in the CCR as proposed, while clarifying the meaning of ''round of sampling'' for systems on six-month monitoring given the new sampling requirements in the LCRR. The final rule requires water systems to include in the CCR the 90th percentile concentration of the most recent round(s) of sampling, the number of sampling sites exceeding the action level, and the range of tap sampling results for lead and copper. These results should be provided for each sampling event completed in the reporting period. This means that water systems on six-month monitoring will be required to include both rounds of lead and copper results. In response to comments, EPA added a new provision requiring water systems to include information in the CCR on how to access the service line inventory. EPA also added a new provision requiring water systems to include information in the CCR on how to access the results of all tap sampling. EPA incorporated some of the commenters' suggested revisions to increase the clarity and accuracy of both the lead informational statement and mandatory health effects statement required in the CCR. The mandatory health effects statement for the final rule reads as follows and is also required in the public notice of an action level exceedance and in public education materials:

Exposure to lead in drinking water can cause serious health effects in all age groups. Infants and children can have decreases in IQ and attention span. Lead exposure can lead to new learning and behavior problems or exacerbate existing learning and behavior problems. The children of women who are exposed to lead before or during pregnancy can have increased risk of these adverse health effects. Adults can have increased risks of heart disease, high blood pressure, kidney or nervous system problems.

B. Public Notification

The current Public Notification Rule (PN) is part of the Safe Drinking Water Act 1996 Right To Know provisions. The rule is designed to ensure that consumers will know if there is a problem with their drinking water. These notices alert consumers if there is risk to public health. They also notify customers: If the water does not meet drinking water standards; if the water system fails to test its water; if the system has been granted a variance (use of less costly technology); or if the system has been granted an exemption (more time to comply with a new regulation). In 2000, EPA revised the existing Public Notification Rule. (40 CFR part 141, subpart Q) The revisions matched the form, manner, and timing of the notices to the relative risk to human health. The revised rule makes notification easier and more effective for both water systems and their customers.

In 2016, section 2106 of the WIIN Act amended section 1414(c)(1) of the SDWA to require water systems to provide to persons served by the system ''[n]otice that the public water system exceeded the lead action level under section 141.80(c) of title 40, Code of Federal Regulations (or a prescribed level of lead that the Administrator establishes for public education or notification in a successor regulation promulgated pursuant to section 1412).'' The WIIN Act also amended section 1414(c)(2) of the SDWA to require EPA's public notification regulations to require systems to notify the public no later than 24 hours after a system learns of an exceedance of the lead action level if it '' ''has the potential to have serious adverse effects on human health as a result of short-term exposure'' just as section 1414(c)(2) has applied to violations of drinking water standards that have the potential to have serious adverse effects on human health as a result of short-term exposure. These situations are currently categorized as ''Tier 1'' under the current public notification rules (see Table 2 to § 141.201). Tier 1 notices must ''be distributed as soon as practicable, but not later than 24 hours, after the public water system learns of the violation or exceedance'' pursuant to section 1414(c)(2)(C)(i) of the SDWA. The WIIN Act also amended section 1414(c)(2)(iii) to require that such notifications be provided to the Administrator in addition to the head of the state agency that has primary enforcement responsibility under section 1413 of the SDWA, as applicable, as soon as practicable, but not later than 24 hours after the public water system learns of the violation or exceedance.'' In a State with primacy, EPA interprets the notice to the Administrator ''as applicable'' only when there is an action level exceedance; it would not apply to other Tier 1 situations where a State has primacy. This notice allows EPA to identify whether it must provide notice as required in section 1414(c)(2)(D), which was added to Section 1414(c)(2) as part of the WIIN Act. It provides that if a State with primary enforcement responsibility or the water system has not issued a notice for an exceedance of a lead action level that has the potential to have serious adverse effects on human health as a result of short-term exposure, the Administrator is required to issue the required notice. Because EPA does not have any obligation to issue a Tier 1 notice for violations of drinking water standards in states with primacy, there is no need for EPA to be notified of those Tier 1 situations.

1. Proposed Revisions

EPA proposed to incorporate these requirements for CWSs and NTNCWSs with a lead ALE as part of proposed revisions to the Lead and Copper Rule (LCR). Specifically, the proposed rule incorporated the amendments to section 1414 of the SDWA in 40 CFR part 141, subpart Q-Public Notification of Drinking Water Violations (and as necessary into any provisions cross-referenced therein), and added exceedances of the lead AL under § 141.80(c) to the list of Tier 1 violations subject to the new 24-hour notice requirements discussed above. EPA proposed to categorize a lead AL exceedance as Tier 1 based on the conclusion that such exceedances ''have the potential to have serious adverse health effects on human health as a result of short-term exposure.'' Since exposure to lead can result in serious health effects as a result of short-term exposure in some circumstances, EPA proposed that any lead AL exceedance result in Tier 1 public notification. In

addition, EPA proposed to update the mandatory health effects statement for PN to be consistent with the proposed CCR revisions.

2. Public Comment and EPA's Response

EPA received many comments expressing concerns about the ability of water systems to meet the proposed 24-hour distribution requirement for notification of an AL exceedance. Many commenters requested that water systems be allowed at least two business days to deliver the public notice. EPA acknowledges commenters' concerns; however, the Agency disagrees that systems would not be able to provide the notice within 24 hours. For several years, water systems have been required to provide Tier 1 notification for certain violations of drinking water standards within 24 hours of learning of the violation. Systems can prepare to provide the notice by creating a notification template in advance and may choose from several options for distribution of a public notification that make it feasible to provide the notice to all persons served by the system within 24 hours of learning of the exceedance. These options are specified in § 141.202(c) of the rule and include broadcast media such as radio and television, posting the notice in conspicuous locations throughout the area served by the water system, hand delivery of the notice to persons served by the water system, or another delivery method approved by the primacy agency.

Many commenters questioned the categorization of a lead AL exceedance as a Tier 1 violation, particularly given it is not a health-based value. Some suggested that it be categorized as a Tier 2 violation. However, as described above, Section 2106 of the 2016 WIIN Act amended section 1414(c)(2) of the SDWA to require EPA's public notification regulations to require systems to notify the public no later than 24 hours after a system learns of an exceedance of the lead AL if it ''has the potential to have serious adverse effects on human health as a result of the customer did not wish to replace the faucet exposure.'' The scientific evidence demonstrates that exposure to lead is associated with increased risk of serious adverse health effects. The strongest evidence is for cognitive effects from prenatal and childhood exposure. Also of concern are studies showing increases in risk of cancer and cardiovascular, renal, reproductive, immunological, and neurological effects in adults (USEPA, 2013; National Toxicology Program, 2012; USEPA, 2004a). Given there is no safe level of lead, and there are life stages (*e.g.,* early childhood) where any lead exposure is especially problematic, lead AL exceedances could have serious adverse health consequences. Accordingly, to avoid these impacts, consumers must be notified as soon as possible as required under the SDWA.

3. Final Revisions

The final rule adds exceedances of the lead AL of 15 µg/L to the list of Tier 1 violations subject to the new 24-hour distribution requirement for notification of an AL exceedance. This is based on the conclusion that such exceedances have the potential to have serious adverse health effects on human health as a result of short-term exposure. Therefore, the final rule requires CWSs and NTNCWSs with a lead ALE to provide public notice to persons served by the system within 24 hours of learning of the ALE; that is, within 24 hours of the system receiving and calculating the 90th percentile value. A copy of the notice must also be sent to both the primacy agency and the Administrator in accordance with the requirements of §§ 141.4(c)(2)(iii) and 141.31(d). EPA has also updated the mandatory health effects language required in the public notice of a lead ALE as well as the CCR and public education materials to enhance clarity and accuracy. The mandatory health effects language in the final rule reads as follows:

Exposure to lead in drinking water can cause serious health effects in all age groups. Infants and children can have decreases in IQ and attention span. Lead exposure can lead to new learning and behavior problems or exacerbate existing learning and behavior problems. The children of women who are exposed to lead before or during pregnancy can have increased risk of these adverse health effects. Adults can have increased risks of heart disease, high blood pressure, kidney or nervous system problems.

C. Definitions

1. Proposed Revisions

Under the Proposed Lead and Copper Rule Revisions, EPA proposed new and revised definitions under § 141.2. Definitions for ''aerator,'' ''pre-stagnation flushing,'' ''wide-mouth bottle,'' and ''tap sampling protocol,'' were added to correspond with proposed rule changes regarding tap sampling methods. In addition, EPA proposed changes to population size criteria for small and medium-size water systems to reflect the 1996 changes to SDWA for small-system flexibility, where small water systems serve 10,000 or fewer customers.

Definitions were added in the proposal to ensure readers understood the criteria for identifying a ''child care facility,'' and a ''school,'' in relation to new sampling requirements for these facilities. In addition, definitions for ''trigger level,'' ''find-and-fix,'' ''customer,'' and ''consumer'' were included in the proposal because ''trigger level'' and ''find-and-fix'' were new requirements under the proposal, while ''customer'' and ''consumer'' referred to defined groups impacted by aspects of the proposal such as public education under § 141.85. Further, in the proposal, terms related to LSLs, such as ''galvanized service line,'' ''trenching,'' ''potholing,'' ''hydrovacing,'' and ''gooseneck, pigtail, or connector,'' were defined because these are processes or materials associated with the LSLR requirements of the proposal. EPA also modified the definition of a ''lead service line'' to better fit the rule requirements in the proposal. These changes included removing lead goosenecks, pigtails, and connectors from the definition and specifying when galvanized lines are considered an LSL for purposes of conducting LSLR. EPA made these modifications to align with rule requirements which prioritize the identification, replacement, and tap sampling at sites with LSLs, as they are the primary source of lead in drinking water when present. The definition of a lead service line does not include lead goosenecks, pigtails or connectors to avoid water systems replacing only lead connectors to meet goal rate and mandatory LSLR requirements.

''Sampling period'' was also added in reference to the months of the year that sampling is permitted under § 141.86, while ''monitoring period'' was added and defined, to refer to the tap sampling frequency the water system is required to conduct. To ensure appropriate implementation of rule requirements, definitions for ''pitcher filter'' and ''point-of-use'' (POU) device were also included in the proposal. Definitions for a ''method detection limit'' (MDL) and a ''practical quantitation level'' (PQL) were provided in the proposed rule to better explain analytical methods in the current and proposed rules.

2. Public Comment and EPA Response

Many commenters were concerned about the new definitions of ''consumer'' and ''customer'' and explained that they were misused or used interchangeably throughout the rule. For instance, in the proposal, ''customer'' was defined as paying users

of the water system, whereas ''consumer'' included all users, including those paying the water bill. Commenters noted there was confusion about their use for LSL notification and public education purposes and interpreted a requirement to notify ''consumers'' to mean any person who may have used the water and questioned how a water system can notify transient populations. Commenters also noted that owners of the service line were not explicitly included in either definition and that they are an important group that should be contacted under certain circumstances. EPA agrees that the proposed definitions may be confusing and has not included them in § 141.2 of the final rule. EPA instead modified the regulatory text to specify the group of people affected in each section of the rule in lieu of using ''consumer'' and ''customer'' (*e.g.,* ''persons served water by a lead service line'') throughout this final rule.

Many comments suggested modifications to the proposed definitions for ''pitcher filter'' such as specifying if EPA intends only the filter or the pitcher and the filter. Other suggestions included requiring pitcher filters to meet a standard by a certifying body that the device reduces lead. EPA agreed with some of the commenters' concerns and has included in the definition that a pitcher filter must be certified by an American National Standards Institute (ANSI) certifying body to reduce lead.

Many commenters requested clarification on definitions for ''child care facility'' and ''school''. Several were opposed to including ''licensed'' with respect to child care facilities while others stated they should be limited to state-licensed child care sites. Some commenters asked EPA to remove ''or other location'' from the definition of ''school''. Some commenters asked if higher education centers like universities and technical schools are included in the school definition and therefore in school sampling requirements. EPA modified the proposed school testing requirements to distinguish testing required at child care facilities and elementary schools versus those for secondary schools. In response to this, EPA has added new definitions for ''elementary school'' and ''secondary school'', so that it is clear which facilities are referred to in the requirements under § 141.92. These definitions are consistent with the National Center for Education Statistics Glossary (*https://nces.ed.gov/programs/coe/glossary.asp*).

After evaluations of public comments, EPA agrees and has modified the definitions of ''school'' and ''child care facility'' in the final rule to reduce any ambiguity as it was not EPA's intent to include locations such as museums or athletic facilities in the definition of ''school'' while EPA has maintained that licensed facilities are included in the ''child care facility'' definition. Commenters asked for more detail on ''wide-mouth bottle'' and EPA has included a specific diameter to define a wide mouth bottle in the final rule.

Many commenters disagreed with how EPA defined ''sampling period'' and ''monitoring period'' stating that EPA did not use these terms consistently throughout the rule. They also note these definitions may conflict with other NPDWRs. In the final LCRR, EPA has uniquely defined these in regard to tap sampling for purposes of the LCRR. The LCRR includes definitions for ''tap sampling monitoring period'' to describe frequency and ''tap sampling period'' to describe the time period in which samples must be collected.

Some of the comments requested clarification on ''unknown'' service lines, which prompted EPA to create new definitions such as ''lead status unknown service line'' to clearly delineate a category for unknown service lines. EPA agrees that clarification is needed and has included descriptions both in the LSL inventory requirements and as a new definition in § 141.2. EPA received significant comment on the definition of an LSL, specifically, whether it is appropriate for a galvanized service line to be considered an LSL if it ever was or is currently downstream of an LSL. Many of these commenters expressed that water systems will not have records to demonstrate if a galvanized service line ''ever was or is currently downstream of any lead service line or service line of unknown material,'' some stating that galvanized service lines should be included regardless of what is upstream. Other commenters stated that galvanized service lines should not be included to reduce burden to the water system. As proposed, most galvanized service lines would be deemed an LSL because of lack of information about upstream LSLs. In addition, commenters questioned why the proposal requires replacement of galvanized lines, but they cannot be used for tap sampling sites. EPA determined that a galvanized service line that is or ever was downstream from an LSL requires replacement but is not included in the LSL definition to reduce confusion and because it has its own definition. In addition, EPA included sites served by a galvanized requiring replacement in the tap sample site selection criteria (tier 3) in the final rule. This also helps clarify that while galvanized service lines that were or are upstream of an LSL require replacement, they are not appropriate sites for tap sampling.

Many commenters were opposed to the exclusion of lead connectors (goosenecks, pigtails, etc.) from the proposed definition of an LSL, some stating this was violating SDWA's anti-backsliding provision under Section 1412(b)(9). Some commenters reference the SDWA definition of an LSL as well as an LSL as defined by the California and Michigan regulations. Commenters provided input about what should and should not be included in the LSL definition and noted where there were contradictions in the rule between tap sampling, LSL inventory and replacement requirements regarding an LSL. EPA agreed that clarity was needed in the definition of an LSL due to its importance related to LSL inventory, LSLR outreach, and selection of tap sample sites and has clarified this in section III.C of this preamble. EPA has modified the definition to simplify it and to specify that it is for the purposes of the LCRR only, to prioritize tap sampling sites and replacement of full LSLs. EPA excluded the lead connector portion of the LSL definition and has clarified the lead connector definition itself. For purposes of this rule, lead connectors are not a part of the service line and are required to be replaced only when identified while conducting other maintenance and replacement activities. EPA has kept these connectors out of the LSL definition to ensure water systems are conducting LSLR on service lines and not counting replacement of connectors as a replaced LSL. A commenter noted that the definition for ''service line sample'' should be removed since the LCRR no longer allows test out of LSLs.

3. Final Rule Requirements

As stated above, EPA has made many changes to the definitions in the Proposed Lead and Copper Rule Revisions, including modifying the proposed definitions, removing some additional terms and defining other additional terms. Definitions that were modified in the final rule include: ''action level,'' ''find-and-fix,'' ''first draw sample,'' ''galvanized service line,'' ''gooseneck, pigtail or connector,'' ''lead service line,'' ''pitcher filter,'' ''point-of-use device,'' ''pre-stagnation flushing,'' ''school,'' ''child care facility,'' ''tap sampling protocol,'' ''wide-mouth bottle,'' and changing

''trigger level'' to ''lead trigger level.'' EPA revised definitions for ''monitoring period'' and ''sampling period'' to ''tap sampling monitoring period'' and ''tap sampling period.''

In addition, EPA has added the following definitions to improve the final rule: ''Full lead service line replacement,'' ''lead status unknown service line,'' ''partial lead service line replacement,'' ''elementary school,'' ''secondary school'' and ''system without corrosion control treatment.'' These were added to ensure consistent implementation for LCRR requirements for preparing a service line inventory, LSLR, carrying out school sampling and conducting CCT studies. In addition, ''hydrovacing,'' ''trenching,'' and ''potholing'' have been removed because of their minimal use in the rule.

EPA has also no longer included the terms ''consumer'' and ''customer'' in the definitions and has instead been more specific in each part of the rule about the impacted person or group. EPA removed the definition for ''service line sample'' because test outs of LSLs are not allowed in the LCRR. EPA has maintained the current definitions of ''small water system'' and ''medium-size water system'' in § 141.2 consistent with the proposal.

V. Rule Implementation and Enforcement

A. What are the state recordkeeping and reporting requirements?

1. Proposed Revisions

EPA proposed requirements that would improve oversight and enforcement of the LCRR by the state. The proposal was consistent with a recommendation from GAO which recommended in its report ''Drinking Water: Additional Data and Statistical Analysis May Enhance EPA's Oversight of the Lead and Copper Rule,'' that EPA require states to report available information about lead pipes to EPA's SDWIS (or a future redesign) database and should require states to report all 90th percentile sample results for small water systems (GAO–17–424, 2017).

2. Public Comment and EPA's Response

Commenters noted the burdensome reporting and recordkeeping requirements of the proposed rule. The many proposed transactions between water systems and states, and between states and the EPA, would cause significant costs for primacy agencies. Many commenters noted that data management is critical for the final LCRR and inquired about the development of SDWIS Prime.

EPA has accounted for the costs to states to implement and enforce the rule requirements in the proposed and final rules. While the costs to states have increased in the final rule relative to the previous rule, public health is better protected under the revised LCRR. The increased costs result from several improvements in the final rule that will benefit public health, such as additional LSLR and better implementation of CCT. These benefits are monetized and presented in the final rule's economic analysis.

EPA is intending to provide states with LCRR data management capabilities through the SDWIS Modernization system development project. EPA worked with states to form the SDWIS Modernization Board in January 2020. The Board is not an advisory group reaching consensus, the Board provided input into the third party-led SDWIS Modernization Alternatives Analysis through the end of June 2020. State members of the Board are expected to convey option recommendations to EPA by the end of July 2020, with EPA expected to select an option in August 2020.

Following option selection, EPA is intending to engage with states in the development and testing of the SDWIS Modernization data system through Spring 2022. EPA will then provide assistance to states in their adoption of the new system. The system will include functions for ensuring data quality as well as for primacy agencies to be able to connect the system to locally run applications, such as the Drinking Water Application running on a state server.

EPA is intending to provide LCRR Data Entry Instructions (DEIs) by Fall 2021. The LCRR DEIs will provide detailed guidance to Primacy Agencies regarding the LCRR monitoring, record keeping, and reporting requirements.

3. Final Rule Requirements

EPA is requiring that the state retain all record keeping requirements from the current LCR. In addition, EPA is requiring the state to maintain a record of all public water system's LSL inventories and annual updates. This information is necessary for the state to calculate goal and mandatory LSLR rates, as well as verify correct tap sample site selection tiering. EPA is also requiring the state to maintain a record of the state's decision and approval related to water system changes to source water or treatment. The state is required to maintain records regarding the required steps water systems must complete as required under the final ''find-and-fix'' requirements.

Finally, the state is also required to maintain records of the small system flexibility compliance alternative the state approved for non-transient non-CWS s and small CWSs. This information allows the state to track water systems' progress with corrosion control treatment, complete LSLR, use of POU devices, and replacement of leaded premise plumbing, as appropriate.

EPA is requiring states to report additional data elements to EPA. The state is required to report the OCCT status of all water systems, including the parameters that define the optimization (for example, orthophosphate residual or target pH and alkalinity values). EPA is requiring that all 90th percentile value be reported for all size systems. EPA has found that many states already voluntarily report 90th percentile lead values for all systems to the SDWIS.

EPA also requires that states report the current number of LSLs at every water system. National information about the numbers of LSLs in public water systems will support EPA oversight of the LCR as well as EPA and other Federal agencies in targeting programs to reduce lead exposure, such programs established by the WIIN Act (WIINA, 2016) and America's Water Infrastructure Act (AWIA, 2018).

B. What are the special primacy requirements?

1. Proposed Revisions

The proposed revision added new primacy requirements to match new requirements in other rule sections, such as state designation of a goal LSLR rate. The proposed rule also included a provision that would give EPA the authority to set an alternative goal rate where it determines an alternative rate is feasible. The new school sampling requirement for water systems resulted in a proposed state requirement to define a school or child care facility and determine if any existing testing program is at least as stringent as the Federal requirements. States must also verify compliance with find-and-fix requirements.

2. Public Comment and EPA's Response

Many commenters noted the increased data management demands of the proposed rule. Some commenters noted that the state flexibilities could create additional work for the states. For example, some commenters preferred EPA to set a national goal-based LSLR rates instead of the state. Some commenters disagreed that EPA should have authority to supersede a state-

approved LSLR goal rate. See section III.D.2. of this document for EPA's response to these comments. States had many other comments about the level of burden on the states required by the rule. EPA acknowledges the increased burden for states but notes that the additional requirements are feasible and will improve implementation and enforcement of the LCRR. EPA received several comments requesting Agency guidance on implementation of the revised rule. EPA understands this is a critical component to ensure the rule's effectiveness in protecting public health. The Agency intends to develop implementation guidance targeting the areas of the rule that are most likely to support compliance. In addition to guidance, EPA will also provide training and other supporting materials that will help states and water systems implement the revised rule, reduce state transaction costs, and promote greater national consistency.

3. Final Rule Requirements

For the final rule EPA clarified that because water systems that serve 10,000 or fewer people do not need to recommend a goal LSLR rate to the state, states do not need to approve a goal LSLR rate for these systems. Water systems below this threshold will follow the small system flexibility and will not engage in a goal-based LSLR program after exceeding the lead trigger level. In response to comments, the final rule does not include provisions for the Regional Administrator to establish an LSLR goal rate that would supersede a state decision. EPA also included a special primacy requirement that states must establish a higher mandatory LSLR rate where feasible for all water systems.

VI. Economic Analysis

This section summarizes the final rule Economic Analysis (EA) supporting document (USEPA, 2020a) for the Lead and Copper Rule (LCR) revisions, which is prepared in compliance with section 1412(b)(3)(C)(ii) of SDWA and under Executive Order 12866. Section 1412(b)(3)(C)(ii) of SDWA states that when proposing a national primary drinking water regulation (NPDWR) that includes a treatment technique, the Administrator shall publish and seek comment on an analysis of the health risk reduction benefits and costs likely to be experienced as the result of compliance with the treatment technique and the alternative treatment techniques that are being considered, taking into account, as appropriate, the factors required under section 1412(b)(3)(C)(i). EPA is also using the health risk reduction cost analysis (HRRCA) in the development of this final rule for purposes of Section 1412(b)(4), (5), and (7) of the SDWA (*i.e.,* to determine the feasibility of the treatment techniques). Clause (i) lists the following analytical elements: (1) Quantifiable and non-quantifiable health risk reduction benefits; (2) quantifiable and non-quantifiable health risk reduction benefits from reductions in co-occurring contaminants; (3) quantifiable and non-quantifiable costs that are likely to occur solely as a result of compliance; (4) incremental costs and benefits of rule options; (5) effects of the contaminant on the general population and sensitive subpopulations including infants, children, pregnant women, the elderly, and individuals with a history of serious illness; (6) any increased health risks that may occur as a result of compliance, including risks associated with co-occurring contaminants; and (7) other relevant factors such as uncertainties in the analysis and factors with respect to the degree and nature of the risk.

Costs discussed in this section are presented as annualized present values in 2016 dollars, which is consistent with the timeframe for EPA's water system characteristic data used in the analysis. EPA estimated the year or years in which all costs occur over a 35-year time period. Thirty-five years was selected to capture costs associated with rule implementation as well as water systems installing and operating corrosion control treatment and implementing LSLR programs. EPA then determined the present value of these costs using discount rates of 3 and 7 percent. Benefits, in terms of health risk reduction from the LCR revisions, result from the activities performed by water systems, which are expected to reduce risk to the public from exposure to lead and copper in drinking water at the tap. EPA quantifies and monetizes some of this health risk reduction from lead exposure by estimating the decrease in lead exposure accruing to children from 0 to 7 years of age from the installation and re-optimization of corrosion control treatment (CCT), LSLRs, and the implementation of point-of-use (POU) filter devices and by quantifying and monetizing the resulting change in intelligence quotient (IQ) in children.

A. Public Comments on the Economic Analysis of the Proposed Rule and EPA Response

EPA published an economic analysis for the proposed rule in accordance with SDWA section 1412(b)(3)(C) (USEPA, 2019f and 2019g). The proposed rule EA and the appendices to the proposed rule EA can be found in the rule docket, under the docket ID numbers EPA–HQ–OW–2017–0300–0003 and EPA–HQ–OW–2017–0300–0002 respectively). EPA solicited comment on all aspects of the economic analysis for the proposed LCRR. In particular, the Agency requested comment on the five drivers of costs identified in its economic analysis: (1) The existing number of LSLs in PWSs; (2) the number of PWS above the AL or TL under the previous rule and proposed rule monitoring requirements; (3) the cost of installing and optimizing corrosion control treatment; (4) the effectiveness of CCT in mitigating lead concentrations; and (5) the cost of LSLR. EPA received a number of comments and data submissions associated with these five topics that the Agency has considered to reevaluate and refine the cost estimates. As a result of the new information submitted by commenters and additional data obtained by EPA in response to comments, the Agency has improved the estimates of costs and benefits for the final rule.

EPA received a number of comments regarding the estimates of the existing number of LSLs in PWSs. Commenters provided state level summary data on the specific systems with LSLs from Indiana, Wisconsin, and Nevada. EPA has evaluated these comments and is using this data in combination with new data collected from states that have LSL inventory requirements (*e.g.,* Michigan, Maryland, Ohio), to update the dataset of systems with LSLs. With this updated data, EPA has significantly expanded, from proposal, the number of systems with known LSL status to determine the baseline proportion of systems below or equal to the TL, above the TL and below or equal to the AL, and above the AL for both the low and high cost scenarios evaluated in the economic analysis. The impact of the expanded dataset of systems with known LSL status was found to have a small impact on the low and high scenario baseline proportion of systems that exceeded the TL or AL between the proposed and final rule analyses.

EPA also received comments on the estimates of the number of water systems that would exceed the TL and AL in the economic analysis for the proposal. EPA received information from the states of Wisconsin, Indiana, Ohio, Connecticut, North Dakota and Nevada about the expected number of water systems that would exceed the TL and AL in those states given a first liter sampling protocol. EPA revised the estimates of systems without LSLs that would exceed the TL and AL based upon first liter sample results and used data provided by these states to assess

the representativeness of the revised estimates for the final economic analysis. After considering the comments on the alternative fifth liter sampling technique for systems with LSLs described in section III.G of this document, EPA prepared revised estimates of the number of systems with LSLs that would exceed the AL and TL as a result of the fifth liter sample requirements in the final rule. EPA used the revised data set of systems with known LSLs to estimate the number of systems that will be required to collect fifth liter samples. In addition, EPA obtained more detailed data from the State of Michigan. The Michigan data represents 2019 lead tap sample compliance data that includes both first and fifth liter lead tap samples from homes with LSLs. EPA estimated the number of systems that would exceed the TL and the AL using the ratio between the first liter and fifth liter 90th percentile values from 133 Michigan systems. This new data from Michigan, along with the expansion of the number of systems with known LSL status, resulted in a larger proportion of systems with ALEs under the low cost scenario and a smaller proportion of systems with ALEs in the high cost scenario in the final rule analysis than was estimated in the proposed rule. This would tend to increase the estimated cost of the final rule low cost scenario compared to the proposal analysis and lower the cost for the final rule high cost scenario compared to the proposal. See Chapter 4, section 4.3.5 of the final rule EA for additional detail (USEPA, 2020a).

EPA received comments on the proposed rule's cost estimates for the installation and operation and maintenance of CCT. The Nevada Division of Environmental Protection provided cost estimates representing four of the state's water systems. Based on the reported information EPA was able to compare the capital and operations and maintenance (O&M) costs of one of the small groundwater systems that had installed a zinc orthophosphate feed system with the EPA Work Breakdown Structure Zinc Orthophosphate Model and the cost curves used in the LCR analysis. Capital cost of the Nevada system fell close to the mid-point of the range between the low and high estimated cost curves used in the proposed regulatory analysis, and the system's O&M costs fell well below the costs estimated by the EPA cost curves. After considering the comments, the Agency has determined that cost estimates for installing and operating CCT in the proposal are accurate for purposes of a national cost estimate and is retaining the methodology for the final rule.

In response to EPA's request for comment about the effectiveness of CCT, the Agency received general comments that CCT is very effective with caveats such as: The water in the distribution system must be used on a regular basis, and sampling should be required to check on proper operation of CCT. The Agency agrees with commenters that CCT can be effective in reducing drinking water lead levels if carefully operated and monitored. The Agency did not receive any comments on how to improve the estimates of the effectiveness of CCT from the proposed economic analysis and is therefore maintaining the same assumptions used in the proposed rule analysis.

EPA received comments on the cost of LSLR, primarily dealing with the need for more current data. EPA agrees with the commenters that new information has become available since the time of proposal that would provide better estimates of LSLR unit costs for the final rule analysis. In the analysis of the proposed rule EPA had developed a dataset of 24 utility reported estimates of LSLR costs. EPA evaluated this dataset along the other replacement cost survey information and selected the American Water Works Association (AWWA) 2011 survey (Cornwell et al., 2016) as the primary source of data for LSLR unit cost estimates for the proposed rule. Since proposal, EPA has identified cost data in news reports, press releases, and utility websites that has allowed the Agency to expand the utility data collected during the proposed rule analysis. The Agency's search found additional cost estimates from 63 utilities. EPA then selected only the subset of data values that represent reported actual replacement costs from pilot studies and/or recent or on-going LSLR projects. This resultant dataset provides costs estimates across full, customer-side, and system-side replacements from 38 systems, which represent costs and practices from 2016 to 2020 (only two cost values from the proposal dataset remain in the revised dataset). The cost information in the updated dataset are variable in the reported replacement costs covered by the various programs, but a number of the data sources specifically indicate they include surface restoration cost. Therefore, the cost analysis for the final rule includes surface restoration. The estimated mean costs for utility-side, customer-side, and full LSLR have increased by 122, 26, and 13 percent, respectively, using the newly developed data as compared with the AWWA 2011 values used for proposal. For the final rule, EPA used the 25th and 75th percentile values from the new dataset in the low and high cost scenarios, respectively. All utility-side, customer-side, and full LSLR unit costs under both the low and high cost scenarios are larger than those used in the proposed rule analysis except for full replacement in the high cost scenario.

In addition to the more specific comments received on the cost of LSLR, public commenters raised concerns about the proposed rule requirement that systems would have to replace, within 45 days, the utility-owned portion of an LSL if they become aware that a customer has replaced their portion of the line. Commenters indicated concern that the number of ''customer initiated'' LSLR might at times become too numerous for systems to complete the replacement within the 45 days allowed. In response to these comments, EPA conducted a search for new data on the number of customer initiated LSLR occurring at water systems. EPA found data from DC Water (2016) that could be used to determine a rate of customer initiated replacements. This new data allowed the Agency to provide quantified costs for customer initiated LSLR in the final rule analysis which were not available at the time of proposal. See Chapter 5, section 5.3.4 of the final rule EA for additional detail (USEPA, 2020a). The inclusion of these new quantified cost categories increases final rule estimated total cost compared to the proposed rule's total cost.

EPA asked for comment on the assumptions regarding labor required to comply with the proposed rule. The Association of State Drinking Water Administrators (ASDWA) provided EPA with a version of their Costs of States Transactions Study (CoSTS) model which estimated the first five years of total and incremental burden to states for implementing the proposed LCRR (a number of individual States and some PWSs also indicated in comments that EPA review the ASDWA CoSTS model). Burden totals from this model were significantly higher for some state oversight activities than those estimated by EPA for the proposed LCRR. EPA carefully evaluated the information and assumptions in the CoSTS model and used them to develop revised state burden estimates for the cost analysis of the final rule. EPA revised cost estimates for a number of state activities including: Administrative activities, technical assistance, review of LSLR plans and LSL inventories, approval of systems' LSLR goals, review and approval of tap sampling site plans,

review of school and child care testing programs, review of annual reports on school and child care testing programs, and review and approval of small system flexibility recommendations. EPA also added a new one-time cost element for both states and PWSs to initially confer on the system's 90th percentile status and new requirements under the LCRR based on the system's first two 6-month monitoring periods under the revised tap sampling requirements of the LCRR. These increases in burden to states will result in higher estimated total costs for the final rule when compared to the burden estimates used in the analysis of the proposed rule.

EPA solicited peer reviewed information on the evidence relevant to quantifying the incremental contribution of blood lead concentrations (especially at blood lead level (BLL) less than 5 µg/dL) to cardiovascular disease (and associated mortality) relative to other predictors such as diet, exercise, and genetics that may be useful in a future benefits analysis. EPA received a number of comments that cited studies which EPA had identified in the proposed rule analysis, as well as one additional study by Chowdhury et al. (2018). Chowdhury et al. is a systematic review on cardiovascular morbidity endpoints that concludes that lead is associated with an increased risk of cardiovascular disease. EPA has added this reference to its qualitative discussions on the health impacts of lead in Appendix J of the final rule EA.

Although the EPA did not quantify or monetize changes in adult health benefits for the proposed LCRR, the Agency estimated the potential changes in adult drinking water exposures and thus blood lead levels to illustrate the extent of lead reduction to the adult population as a result of the proposed LCRR. Commenters indicated that the Agency should include quantification and monetization of the adult cardiovascular disease (CVD) benefits associated with reductions in water lead concentrations in the health risk reduction and cost analysis (HRRCA referred to in this notice as the final rule economic analysis or final rule EA) for the LCRR. Some of the commenters have indicated that EPA has a legal obligation to include this benefit in the HRRCA under section 1412(b)(3) of SDWA. EPA does not agree with these commenters that a quantified assessment of CVD benefits is necessary in this HRRCA. EPA conducts a HRRCA when proposing any NPDWR, as required in section 1412(b)(3)(C)(i) and (ii) of the SDWA. SDWA Section 1412(b)(3)(C)(i)(I) requires the inclusion of quantifiable and nonquantifiable health risk reduction benefits for which there is a factual basis in the rulemaking record to conclude such benefits are likely to occur as a result of the rule. SDWA section 1412(b)(3)(C)(iii) provides that ''[t]he Administrator may identify valid approaches for the measurement and valuation of benefits'' for the HRRCA. EPA exercised its discretion to identify the validity of the approaches used to measure and value CVD benefits and determined not to quantify CVD benefits for this rulemaking because the methodology which links changes in adult blood lead levels to CVD health endpoints, including mortality, has not yet undergone the necessary panel peer review. There remains uncertainty about the best quantitative relationship to describe the impacts of changes in current adult blood lead levels on the risk of CVD mortality. The studies currently available to the Agency which quantitatively describe the risk relationship attempt to control for a variety of potential confounders that may affect CVD risk as well as exposure to lead. EPA needs additional scientific guidance on which studies sufficiently control for potential confounding factors that might introduce bias into the estimated lead CVD risk relationship. The Agency will also seek input from an expert peer review panel on the modeling of the lead cessation lag (*i.e.,* the time between the lead exposure reduction and the reduction in CVD risk). For additional information on the uncertainties associated with the assessment of the CVD mortality health endpoint which need to be clarified through the panel peer review process see Appendix J of the final rule EA. However, EPA has considered the substantial unquantified benefits to the rule, including those associated with reductions in adverse cardiovascular effects that are described in the HRRCA.

Some commenters asserted that if the Agency monetized the benefits of CVD, the Agency would have proposed more stringent requirements because greater quantified benefits would justify more burdensome regulation. EPA disagrees. The Agency considered information from the HRRCA at proposal to determine, as required by SDWA section 1412(b)(4)(C) ''whether the benefits . . . justify, or do not justify, the costs.'' The Agency found that the quantified and non-quantified benefits justified the cost of the proposed rule requirements. EPA considered costs and benefits in its rulemaking process, as required by SDWA. The Agency established the treatment technique requirements in the rule to ''prevent known or anticipated adverse effects on the health of persons to the extent feasible'' consistent with section 1412(b)(7)(A) of the SDWA, while also ensuring that ''[a]ny revision of a national primary drinking water regulation shall . . . maintain, or provide for greater, protection of the health of persons'' as required in section 1412(b)(9) of the SDWA. EPA is not employing the discretionary provision of SDWA section 1412(b)(6) that allows the Agency to promulgate an NPDWR that ''maximizes health risk reduction benefits at a cost that is justified by the benefits.'' Therefore, the Agency's decision to not monetize CVD benefits did not affect the stringency of the final rule. EPA conducted an analysis of quantifiable and non-quantifiable benefits that meets the statutory requirements and EPA considered both quantified and non-quantified benefits in the rulemaking.

EPA received a number of comments that encouraged the Agency to obtain more data to better estimate the costs and benefits of the proposed rule. EPA engaged in additional data collection in response to comments improving upon the analysis conducted for the proposed rule. The Agency collected information post proposal from state and Federal websites, new reports, independent and drinking water system developed reports, and vendor information resulting in updates to: The number of systems with known LSL status; the unit cost of LSLR; the rate of customer initiated LSLR; the cost of scavenged pipe-loop and coupon CCT studies; the number of schools and child cares; and the current amount of state required school and child care testing.

EPA reexamined the profile data set that was used by the Agency to estimate the reductions of lead levels as a result of CCT and LSLR. EPA reviewed the CCT designations made in the profile dataset and changed the designations based on new information. Re-running the model that simulates the water lead concentrations for various combinations of CCT and LSL presence for the final rule analysis resulted in increased lead concentrations for the no-LSL present scenarios and lower lead concentrations for the cases where full and partial LSLs are present and there is no or partial CCT present as compared to the estimated values used in the proposed rule analysis (see Exhibit 6–15 for the complete list of estimated concentrations used in the final rule analysis). The new estimates for lead concentration result in smaller changes in exposure as compared with the proposed rule. So, relative to the

proposed rule a unit improvement in CCT or LSLR will result in smaller changes in lead concentration reductions, BLL reductions, and monetized IQ benefits.

Exhibit 6–1 summarizes the data improvements made in response to comments received on the proposed rule analysis that have an impact of the estimated costs and benefits for the final rule. These impacts are separate from and irrespective of changes to the regulatory requirements. The exhibit indicates the impact the data change had on estimated costs.

EXHIBIT 6–1—DATA IMPROVEMENTS MADE IN RESPONSE TO COMMENTS RECEIVED ON THE PROPOSED LCRR ANALYSIS

Data	Impact on cost/benefit estimate from proposal
Expanded dataset of systems with known LSL status	• Small impact on estimated cost for previous rule (baseline).
2019 State of Michigan lead compliance data used in conjunction with expanded dataset of systems with known LSL status.	• Increase low cost scenario estimated cost. • Decrease high cost scenario estimated cost.
Lead Service Line Replacement unit costs	• Increase estimated costs.
Estimate for customer initiated LSLR	• Increase estimated cost (only qualitatively considered in the proposal).
Updated state burden estimates based on ASDWA CoSTS model	• Increase estimated costs.
Revised tap water lead concentration values	• Decrease estimated benefit.

B. Affected Entities and Major Data Sources Used To Characterize the Sample Universe

The entities potentially affected by the LCR revisions are public water systems (PWSs) that are classified as either CWSs or NTNCWSs. These water systems can be publicly or privately owned. In the economic analysis modeling performed in support of this rulemaking, EPA began with the 50,067 CWSs and 17,589 NTNCWSs in the Safe Drinking Water Information System Fed Data Warehouse (SDWIS/Fed) as its foundational data set.

EPA used a variety of data sources to develop the drinking water industry characterization for the regulatory analysis. Exhibit 6–2 lists the major data sources, describes the data used from each source, and explains how it was used in the final rule EA. Additional detailed descriptions of these data sources and how they were used in the characterization of baseline industry conditions can be found in Chapter 4 of the final rule EA (USEPA, 2020a).

EXHIBIT 6–2—MAJOR DATA SOURCES USED TO DEVELOP THE BASELINE INDUSTRY CHARACTERIZATION

Data source	Baseline data derived from the source
SDWIS/Fed third quarter 2016 "frozen" dataset [1]	• Public water system inventory, including population served, number of service connections, source water type, and water system type. Also used to identify NTNCWSs that are schools and child care facilities. • Status of CCT, including identification of water systems with CCT and the proportion of water systems serving ≤ 50,000 people that installed CCT in response to the previous LCR. • Analysis of lead 90th percentile concentrations to identify water systems at or below the TL of 10 μg/L, above the TL, and above the AL of 15 μg/L at the start of rule implementation by LSL status, *i.e.,* presence or absence of LSLs for the previous rule and LCRR. Used in concert with data from Michigan described below for the LCRR.[2 3] • The proportion of water systems that are on various reduced monitoring schedules for lead and copper tap and WQP monitoring. • The frequency of source and treatment changes and those source changes that can result in additional source water monitoring. • Length of time that water systems replace LSLs if required under the previous LCR.
2006 CWSS (USEPA, 2009)	• Number of distribution system entry points per system. • PWS labor rates.
Geometries and Characteristics of Public Water Systems (USEPA, 2000a).	• Design and average daily flow per water system.
1988 AWWA Lead Information Survey	• LSL inventory, including the number of water systems with LSLs, and the average number of LSLs per water system, as reported in the 1991 LCR RIA (Weston and EES, 1990).
2011 and 2013 AWWA Surveys of Lead Service Line Occurrence (as summarized in Cornwell et al., 2016).	• LSL inventory, including the number of water systems with LSLs and the average number of LSLs per water system.
Six-Year Review 3 of Drinking Water Standards (2006–2011)	• Baseline distribution of pH for various CCT conditions. • Baseline orthophosphate dose for CCT.

EXHIBIT 6–2—MAJOR DATA SOURCES USED TO DEVELOP THE BASELINE INDUSTRY CHARACTERIZATION—Continued

Data source	Baseline data derived from the source
2019 State of Michigan Lead and Copper Compliance Monitoring Data (Michigan EGLE, 2019).	• Analysis of the ratio of fifth to first liter lead tap samples to estimate the increase in lead 90th percentile levels based on the use of fifth liter samples. Ratios are applied to SDWIS/Fed lead 90th percentile data to identify systems at or below the TL of 10 μg/L, above the TL, and above the AL of 15 μg/L under the final LCRR by LSL status. • Percent of individual samples exceeding 15 μg/L for the final LCRR.

Acronyms: AL = action level; AWWA = American Water Works Association; CCT = corrosion control treatment; CWSS = Community Water System Survey; LCR = Lead and Copper Rule; LCRR = Lead and Copper Rule revisions; LSL = lead service line; Michigan EGLE = Michigan Department of Environment, Great Lakes, and Energy; NTNCWS = non-transient non-community water system; public water system; RIA = regulatory impact assessment; SDWIS/Fed: Safe Drinking Water Information System/Federal Version; TL = trigger level; WQP = water quality parameter; USEPA = United States Environmental Protection Agency.

NOTE:

[1] Contains information reported through June 30, 2016.

[2] As detailed in Chapter 3 of the Economic Analysis for the Lead and Copper Rule Revisions (USEPA, 2020a), a system's lead 90th percentile level is a key factor in determining a system's requirements under the previous rule and final LCRR.

[3] In the analysis of lead 90th percentile concentrations at PWSs EPA used SDWIS/Fed data for systems with known LSL status. This sub-set of systems with known LSL status was identified using data from 12 states (including data received in public comments from Indiana, Wisconsin, and Nevada), Region 9 tribal systems, and web searches identifying individual systems including the systems serving greater than 1,000,000 persons. See Chapter 4, section 4.3.5 of the Economic Analysis for the Lead and Copper Rule Revisions (USEPA, 2020a) for additional detail.

C. Overview of the Cost-Benefit Model

Under the regulatory provisions of the final rule, PWSs will face different compliance scenarios depending on the size and type of water system, the presence of LSLs, and existing corrosion controls. In addition, PWSs will also face different unit costs based on water system size, type, and number of entry points (*e.g.,* labor rates and CCT capital, and O&M unit costs). PWSs have a great deal of inherent variability across the water system characteristics that dictate both compliance activities and cost.

Because of this variability, to accurately estimate the national level compliance costs (and benefits) of the final LCR revisions, as well as describe how compliance costs are expected to vary across types of PWSs, the cost-benefit model creates a sample of representative ''model PWSs'' by combining the PWS-specific data available in SDWIS/Fed with data on baseline and compliance characteristics available at the PWS category level. In some cases, the categorical data are simple point estimates. In this case, every model PWS in a category is assigned the same value. In other cases, where more robust data representing system variability are available the category-level data includes a distribution of potential values. In the case of distributional information, the model assigns each model PWS a value sampled from the distribution, in order to characterize the variability in this input across PWSs. The model follows each model PWS in the sample through each year of analysis—determining how the PWS will comply with each requirement of the final rule, estimating the yearly compliance cost, and tracking the impact of the compliance actions on drinking water lead concentrations. It also tracks how other events, such as changing a water source or treatment affect the water system's compliance requirements for the next year.

The model's detailed output provides results for 36 PWS categories, or strata. Each PWS reporting category is defined by the water system type (CWS and NTNCWS), primary source water (ground and surface), and size category (there are nine). The following sub-sections present summarized national cost and benefit totals by regulatory categories. The detailed output across the 36 PWS categories can be found in Appendix C of the final rule EA (USEPA, 2020a).

In constructing the initial model PWS sample for the cost-benefit analysis, EPA began with the 50,067 CWSs and 17,589 NTNCWS in SDWIS/Fed. Also, from SDWIS/Fed, EPA knows each water system's type (CWS or NTNCWS); primary water source (surface water or groundwater); population served; CCT status (yes/no); ownership (public or private); and number of connections.

The available LCR data limited EPA's ability to quantify uncertainty in the cost-benefit model. During the development of the model, it became clear that not only were many of the inputs uncertain, but for many LCR specific inputs, EPA only has limited midpoint, high, and low estimates available and does not have information on the relative likelihood of the available estimates. This includes major drivers of the cost of compliance including: The baseline number of systems with LSLs and the percent of connections in those system that are LSLs; the number of PWSs that will exceed the AL and/or TL under the revised tap sampling requirements; the cost of LSL replacement; the cost of CCT; and the effectiveness of CCT in PWSs with LSLs. Therefore, EPA estimated final LCRR compliance costs under low and high bracketing scenarios. These low and high cost scenarios are defined by the assignment of low and high values for the set of uncertain cost drivers listed above. Detailed descriptions of these five uncertain variables and the derivation of their values under the low and high cost scenarios can be found in Chapter 5, Section 5.2.4.2 of the final rule EA (USEPA, 2020a). With the exception of the five uncertain variables which define the difference between the low and high cost scenarios the remaining baseline water system and compliance characteristics are assigned to model PWSs, as described above, and remain constant across the scenarios. This allows EPA to define the uncertainty characterized in the cost range provided by the low and high scenarios and maintains consistency between the estimation of costs for the previous and final rules (*e.g.,* percentage of lead tap water samples that will be invalidated). Chapters 4 and 5 of the final rule EA describe in greater detail the baseline and major cost driving data elements, their derivation, and the inherent sources of uncertainty in the developed data elements. Section 5.3 and 5.4 of the final rule EA discuss how each data element is used in the estimation of costs and provides examples and references to how these data were developed.

Because PWS baseline characteristics are being assigned from distributional source data to capture the variability across PWS characteristics, EPA needed to ensure that its sample size was large enough that the results of the cost-benefit model were stable for each of the

36 PWS categories. To ensure stability in modeled results, EPA oversampled the SDWIS/Fed inventory to increase the number of water systems in each PWS category. For every PWS category, EPA set the target minimum number of model PWSs to 5,000. To calculate the total estimated costs for each PWS category, the model weights the estimated per water system costs so that when summed the total cost is appropriate for the actual number of water systems known to be in the category.

The exception to the assignment of water system characteristics discussed above are the 21 very large water systems serving more than one million people. Because of the small number of water systems in this size category, the uniqueness of their system characteristics, and the potential large cost for these systems to comply with the regulatory requirements, using the methods described above to assign system attributes could result in substantial error in the estimation of the national costs. Therefore, EPA attempted to collect information on very large water systems' CCT practices and chemical doses, pH measurements and pH adjustment practices, number of LSLs, service populations, and average annual flow rates for each entry point to the distribution system. EPA gathered this information from publicly available data such as SDWIS/Fed facility-level data, Consumer Confidence Reports, and water system websites. In addition, the AWWA provided additional data from member water systems to fill in gaps. When facility-specific data was available, EPA used it to estimate compliance costs for the very large water systems. If data was not available, EPA assigned baseline characteristics using the same process as previously described. See Chapter 5, Section 5.2.4.3 of the final rule EA for a summary of the data EPA collected on these very large systems (USEPA, 2020a).

The cost model estimates the incremental cost of the LCR revisions over a 35-year period. In accordance with EPA's policy, and based on guidance from the Office of Management and Budget (OMB), when calculating social costs and benefits, EPA discounted future costs (and benefits) under two alternative social discount rates, 3 percent and 7 percent.

When evaluating the economic impacts on PWSs and households, EPA uses the estimated PWS cost of capital to discount future costs, as this best represents the actual costs of compliance that water systems would incur over time. EPA used data from the 2006 Community Water System Survey (CWSS) to estimate the PWS cost of capital. EPA calculated the overall weighted average cost of capital (across all funding sources and loan periods) for each size/ownership category, weighted by the percentage of funding from each source. The cost of capital for each CWS size category and ownership type is shown in Exhibit B–3 in Appendix B of the final rule EA. Since similar cost of capital information is not available for NTNCWSs, EPA used the CWS cost of capital when calculating the annualized cost per NTNCWS. Total capital investment may be greater than costs water systems bear when complying with future regulatory revisions because financing support for lead reduction efforts is available from State and local governments, EPA programs, and other Federal agencies. The availability of funds from government sources, while potentially reducing the cost to individual PWSs, does not reduce the social cost of capital to society. See Chapters 4 and 5 of the final rule EA for a discussion of uncertainties in the cost estimates.

EPA projects that rule implementation activities will begin immediately after rule promulgation. These activities will include one-time PWS and State costs for staff to read the revised rule, become familiar with its provisions, and develop training materials and train employees on the revised rule. States will also incur burden hours associated with adopting the rule into state requirements, updating their LCR program policies and practices, and modifying data management systems. PWSs will incur costs to comply with the LSL materials inventory requirements and develop an initial LSLR plan in years one through three of the 35-year analysis period. EPA expects that water systems will begin complying with all other LCRR rule requirements three years after promulgation, or in year four of the analysis.

Some requirements of the final rule must be implemented by water systems regardless of their water quality and tap sampling results (*e.g.,* CWS school and child care facilities sampling programs), however, most of the major cost drivers are a function of a water systems 90th percentile lead tap sample value. The 90th percentile value, if it exceeds the lead trigger level or action level, dictates: The tap sampling and water quality parameter (WQP) monitoring schedules, the installation/re-optimization of CCT, ''find-and-fix'' adjustments (triggered when a single lead tap sample exceeds 15 µg/L, which has an increasing likelihood in the model as 90th percentile tap sample results increase) which include potential changes to CCT, the installation of point-of-use filters at water systems selecting this treatment option as part of the small water system flexibilities under the final rule, the goal-based or mandatory removal of LSLs and water system and state administrative costs. Because of uncertainty in the estimation of the 90th percentile lead values the Agency developed low and high estimates for this cost driving variable. EPA used both the minimum and maximum 90th percentile tap sample values from SDWIS/Fed over the period from 2007 to 2015, to assign a percentage of PWSs by size, and CCT and LSL status to each of three groups, those at the trigger level (TL) or below, those above the lead trigger but at or below the action level (AL), and those above the lead AL. These assignments represent the status of systems under the previous rule. See Chapters 4 and 5 of the final rule EA for additional information (USEPA, 2020a).

Because the tap sampling requirements for LSL water systems under the final LCR revisions call for 100 percent of lead tap samples to be taken from sites with LSLs and for those samples to be fifth liter samples, representing the lead concentration from the LSL, the likelihood that a PWS would have a lead 90th percentile greater than the TL or AL is higher under the final rule compared to the previous LCR. In order to assess this higher likelihood of TL or AL exceedances under the LCRR tap sampling requirements EPA used information from Slabaugh et al. (2015) to develop adjustment factors to capture the impact of taking 100 percent of lead tap samples from sites with LSLs. To account for the fifth liter sampling requirement at LSL sites EPA used 2019 State of Michigan compliance sampling data that was received as part of the public comment process on the proposed rule. This dataset had paired first and fifth liter sampling data for 133 LSL systems (Michigan state law requires that both first and fifth liter samples be taken at LSL sites) that allowed the Agency to calculate a set of ratios representing the relationship between first and fifth liter lead 90th percentile values. EPA assigned the LSL systems to the three 90th percentile value groups, those without a TL or AL exceedance, those with a TL but not an AL exceedance, and those with an AL exceedance utilizing the adjustment factors derived from the Slabaugh et al. (2015) data and the calculated ratios from the Michigan dataset. The use of the Michigan data results in large numbers of systems being assigned to

the AL exceedance category for the low cost scenario and fewer systems being assigned to the AL exceedance category in the high cost scenario that would have occurred using the proposed rule assignment methodology. A detailed discussion of the development of the 90th percentile value initial group placement, the adjustments made for the LSL water systems given the tap sampling requirements, and the percentages of systems assigned to the 90th percentile value groups under both the previous and final LCRR for the low and high cost scenarios are found in Chapters 4 and 5 of the EA. Once water systems are assigned to the groupings based on their CCT and LSL status, individual 90th percentile lead tap sample values are assigned from the distribution of 90th percentile values within each grouping.

Several regulatory compliance activities are assumed to not affect a water system's 90th percentile value. These include, for example, developing an inventory of LSLs, CWS sampling at schools and child care facilities, and public education. In the model, the only compliance activities that will change a water system's 90th percentile lead tap sample are installation of CCT; re-optimization of existing CCT; removal of LSLs; and a water system-wide ''find-and-fix'' activity (assumed to be equivalent to a system-wide increase in pH). In addition to these rule compliance activities, changing a water source or treatment technology can also result in a change in a water system's 90th percentile tap sample value.

Because a water system's 90th percentile lead value is so important to determining regulatory requirements and cost under the rule revisions, the cost model, under both the low and high cost scenarios, tracks each water system's 90th percentile lead value over each annual time step in the model. Based on the initial 90th percentile lead values, a number of rule compliance actions are triggered. With the implementation of CCT, LSLR, and ''find-and-fix'' corrections, 90th percentile lead tap sample values are expected to decrease. The model allows for future increases in 90th percentile lead values as a result of changes in source water and treatment. The likelihood of these events occurring have been derived from SDWIS/Fed data (see Chapter 4, Section 4.3.8 of the final rule EA). When a change in source or treatment occurs in a modeled year, a new 90th percentile value is assigned to the water system. This value may be higher or lower than the current value thus potentially triggering new corrective actions. In the model, if a water system already has ''optimized'' CCT in place, it is assumed that no additional action is needed and that the current treatment is adequate, therefore the 90th percentile will not change.

D. Cost Analysis

This section summarizes the cost elements and estimates total cost of compliance for the previous LCR, the final LCR revisions and the incremental cost of the final rule, under both the low and high cost scenarios, by the major regulatory components and discounted at 3 and 7 percent. These components include implementation and administrative costs, sampling costs, CCT costs, LSL inventory and replacement costs, POU costs, and public education and outreach costs for water systems and states. Note that reporting costs are represented in the cost totals provided in the estimates below, but a separate summary of the reporting costs, as required by the Paperwork Reduction Act, can be found in section VII.C of this preamble. This section also quantifies the potential increase in phosphates that would result from the increased use of corrosion inhibitors under the rule, the resulting cost for treating to remove the additional phosphates at downstream waste water treatment plants that may be constrained by nutrient discharge limits, and discusses the ecological impacts that may result from increased phosphorus loads to surface waters.

1. Drinking Water System Implementation and Administrative Costs

All water systems will have one-time start-up activities associated with the implementation of the LCRR. These compliance costs include water system burden to read and understand the revised rule; water systems assigning personnel and resources for rule implementation; water system personnel time for attending trainings provided by the state; and clarifying regulatory requirements with the state during rule implementation. This category of cost is not impacted by the variables that define the low and high cost scenarios, therefore only one set of estimated costs exist in the category. The estimated annualized national PWS implementation and administrative costs for the LCR revisions are $2,576,000 at a 3 percent discount rate and $4,147,000 at a 7 percent discount rate. Since there are no costs in this category under the previous LCR, the PWS implementation and administrative incremental costs are also $2,576,000 at a 3 percent discount rate and $4,147,000 at a 7 percent discount rate. Additional information on the estimation of water system implementation and administrative costs can be found in Chapter 5, section 5.3.1 of the final rule EA (USEPA, 2020a).

2. Sampling Costs

The final LCR revisions affect most of the LCR's sampling requirements, including lead tap sample monitoring, lead WQP monitoring, copper WQP monitoring, and source water monitoring. The revised rule also includes new requirements for CWSs to sample at schools and child care facilities within their distribution systems. The copper tap sampling requirements of the previous rule are not impacted by the regulatory revisions and therefore do not appear in the summarized sampling costs. Additional lead WQP monitoring and lead tap sampling that is specifically required by the previous rule and the LCRR after the installation or re-optimization of corrosion control treatment is accounted for in the CCT costs and not in the WQP monitoring or tap sampling costs.

Lead tap sampling site selection tiering requirements have been strengthened under the revised rule, increasing the cost to water systems with LSLs for the development of a tap sampling pool that consists of all LSL sites. Also, the sampling protocol requiring fifth liter samples from LSL sites will impact the cost of materials used to collect the tap sample at each LSL location. The other cost components of lead tap sampling remain generally unchanged and include sample collection (apart from fifth liter testing kit costs), analysis, and reporting cost. The frequency of required lead tap sampling will also increase based on lead tap sample 90th percentile values calculated with fifth liter tap samples.

Both the lead and copper WQP monitoring cost totals represent collection and lab analysis cost of samples both at entry points to and taps within the distribution system, as well as PWS reporting costs. The schedules for conducting these activities at modeled water systems are dependent on a water system's projected lead 90th percentile value, the presence of CCT, and past tap sampling results.

The final rule requires source water monitoring the first time a PWS has an action level exceedance. This monitoring is not required again unless the water system has a change in source water.

Sampling at schools and child care facilities represents new requirements for CWSs under the LCR revisions.

Unlike the other sampling requirements of the rule, school and child care facility sampling is not affected by a water system's 90th percentile lead tap sample value. The final rule requires that all schools and child care facilities (constructed prior to January 1, 2014 or the date the state adopted standards that meet the definition of lead free in accordance with Section 1417 of the Safe Drinking Water Act, as amended by the Reduction of Lead in Drinking Water Act, whichever is earlier) must be sampled once every five years (schools and child care facilities may refuse the sampling or be non-responsive, but the water system must document this refusal or non-response to the state) for two consecutive rounds of sampling. After the initial sampling at all elementary school and child care facilities in their service area (over a five year period) CWSs are only required to provide sampling upon request from the school or child care facility. CWSs must conduct sampling at secondary schools at any time on request. This program's costs are presented with sampling cost, but they also represent public education costs of the LCRR. The costs of complying with the rule include water systems: (1) Identifying schools and child care facilities in their service area and preparing and distributing an initial letter explaining the sampling program and the 3Ts Toolkit, (2) coordinating with the school or child care facility to determine the sampling schedule and the logistics of collecting the samples, (3) conducting a walkthrough at the school or child care facility before the start of sampling, (4) sample collection from the school or child care facility, (5) sample analysis, and (6) providing sampling results to the school or child care facility, the state, and the local and/or state health department.

Exhibit 6–3 and 6–4 show the national annualized sampling costs for both the low and high estimate scenarios, under the previous LCR, the final LCRR, and the incremental cost, discounted at 3 and 7 percent, respectively. Additional information on the estimation of sampling cost can be found in the Chapter 5, section 5.3.2 of the final rule EA (USEPA, 2020a).

EXHIBIT 6–3—NATIONAL ANNUALIZED SAMPLING COSTS—ALL PWS AT 3% DISCOUNT RATE

[2016$]

	Low cost estimate			High cost estimate		
	Previous LCR	Final LCRR	Incremental	Previous LCR	Final LCRR	Incremental
Lead Tap Sampling Monitoring	$34,536,000	$46,775,000	$12,239,000	$36,604,000	$55,386,000	$18,782,000
Lead Water Quality Parameters Monitoring	7,265,000	8,225,000	959,000	8,311,000	10,211,000	1,900,000
Copper Water Quality Parameters Monitoring	140,000	152,000	13,000	134,000	150,000	16,000
Source Water Monitoring	20,000	9,419	−11,000	50,000	31,000	−18,000
School Sampling	0	12,582,000	12,582,000	0	12,960,000	12,960,000
Total Annual Sampling Costs	41,962,000	67,744,000	25,782,000	45,099,000	78,739,000	33,641,000

EXHIBIT 6–4—NATIONAL ANNUALIZED SAMPLING COSTS—ALL PWS AT 7% DISCOUNT RATE

[2016$]

	Low cost estimate			High cost estimate		
	Previous LCR	Final LCRR	Incremental	Previous LCR	Final LCRR	Incremental
Lead Tap Sampling Monitoring	$33,746,000	$47,597,000	$13,851,000	$36,573,000	$58,566,000	$21,993,000
Lead Water Quality Parameters Monitoring	6,986,000	7,980,000	995,000	8,397,000	10,683,000	2,286,000
Copper Water Quality Parameters Monitoring	133,000	145,000	12,000	128,000	143,000	15,000
Source Water Monitoring	25,000	13,000	−12,000	66,000	45,000	−20,000
School Sampling	0	14,461,000	14,461,000	0	14,969,000	14,969,000
Total Annual Sampling Costs	40,890,000	70,197,000	29,307,000	45,164,000	84,407,000	39,243,000

3. Corrosion Control Treatment Costs

Under the LCRR, drinking water systems are required to install CCT or re-optimize their existing CCT if their lead tap sample 90th percentile exceeds the trigger level or action level. A system may be required to perform a ''find-and-fix'' adjustment to their CCT based on their current level of CCT in place if an individual lead tap samples exceed 15 µg/L. In the cost model, 90th percentile lead tap sample exceedances are initially determined using SDWIS/Fed historic data which is adjusted to account for sampling at 100 percent LSL sites in LSL systems and the fifth liter sampling methodology changes. In subsequent model periods a 90th percentile lead tap sample exceedance can be triggered by a change in water system source water or treatment. Small CWSs serving 10,000 or fewer people and all NTNCWSs may also elect to conduct LSLR or implement a POU program as part of the regulatory flexibilities in the LCRR. See section III.E of this preamble for additional information on the compliance alternatives available to small CWSs and NTNCWSs, and section VI.D.5 for a discussion of the modeling and a summary of the number of systems estimated to select each alternative compliance option.

The capital and O&M costs for water systems installing or optimizing CCT are based on the assumption that water systems will install and operate CCT that achieves finished water characteristics of 3.2 mg/L of orthophosphate and pH at or above 7.2 (for water systems with starting pH values less than 8.4). For those water systems assigned higher initial pH values in the model, between 8.4 and 9.2, EPA assumed the CCT optimization would require adjusting pH to meet or exceed 9.2 (no orthophosphate addition would be needed). The distributions of water system starting values for orthophosphate and pH, used in the cost model, are both drawn from SDWIS/Fed and Six-Year Review Information Collection Request (ICR) dataset (see Chapter 4, section 4.3.6 of the final rule EA).

All capital cost equations are a function of design flow, and all O&M costs are a function of average daily flow. Since CCT is conducted at the

water system's entry points (EPs), the cost model calculates the design flow and average daily flow of each EP. The cost model uses two different sets of unit cost functions representing the low and high capital cost scenarios developed in the engineering Work Breakdown Structure models for CCT (see EPA's report: Technologies and Costs for Corrosion Control to Reduce Lead in Drinking Water (USEPA, 2020b)). Using these bracketing capital cost values is designed to characterize uncertainty in the cost model estimates and when combined with O&M costs and EP flow values, are used to calculate the low and high CCT cost estimates per model PWS. Note that optimization O&M costs are obtained through an incremental cost assessment. The cost model calculated the O&M existing cost and subtracts them from the optimized O&M cost to obtain the incremental re-optimization costs.

In the cost model, water systems are assumed to always install and optimize their CCT, to the standards described above, before making any adjustment to CCT as a result of being triggered into the ''find-and-fix'' requirements of the rule. Each time a model PWS has individual lead tap samples exceeding 15 µg/L in a monitoring period, costs for follow-up lead tap and WQP sampling are applied. In the case of corrective actions, there are four stages implemented with each successive ''find-and-fix'' trigger. In the first period, where a tap sample is above 15 µg/L, the model assumes there was a site specific sample issue and no water quality adjustments are needed. The second period having an exceedance results in the implementation of a spot flushing program to reduce water age in affected areas of the distribution system. With the third ''find-and-fix'' trigger, one of two things are assumed to occur at a single-entry point: A water system that has orthophosphate dosing and the pH target of 7.2 or greater will increase pH to 7.5, or a water system that previously optimized to a pH value of 9.2 will increase pH to 9.4. If ''find-and-fix'' is triggered for a fourth time, a water system is assumed to adjust all EPs to the new target pHs of 7.5 or 9.4, depending on the current treatment in place.

Using O&M cost functions estimated for ''find-and-fix'' (see the Technologies and Costs for Corrosion Control to Reduce Lead in Drinking Water (USEPA, 2020b)), the cost model, when triggered into stage 3 and 4 CCT adjustment, first calculates the total annual O&M cost for treating to the ''find-and-fix'' standards previously listed as if no CCT was installed, then subtracts the PWS's current CCT annual O&M cost from the new ''find-and-fix'' annual O&M cost, to derive the share of the PWS's annual CCT O&M costs attributable to ''find-and-fix'' actions. The model also calculates the capital cost to retrofit the CCT water system for additional pH adjustment under both the low and high cost model scenarios. If a water system is triggered into a fourth round of ''find-and-fix'' CCT adjustment, the 7.5 or 9.4 pH requirements will be applied to all entry points. Individual entry point costs are summed to obtain total water system costs under the low and high model runs.

In addition to the capital and O&M cost of CCT installation, re-optimization, or ''find-and-fix,'' water systems will also face several ancillary costs associated with changes in CCT status. Before the installation or re-optimization of CCT at a water system, a CCT study may need to be conducted or revised and the water system would need to consult with the state on the proposed changes to CCT (these costs also apply to water systems undergoing source water or treatment changes). After the change in CCT, a water system would conduct follow-up tap sampling and WQP monitoring at entry points and at taps in the distribution system, report the results of the initial post-CCT adjustment findings to the state, and review WQP data with the state on an ongoing basis as part of the water system's sanitary surveys. See the final rule EA Chapter 5, Section 5.3.3.3 for additional detail on these requirements (USEPA, 2020a).

Exhibits 6–5 and 6–6 show the range of estimated national costs for CCT under the previous LCR, the LCR revisions, and the incremental cost, discounted at 3 and 7 percent, respectively. Note that a range of CCT capital costs are used in this assessment, but the total range in Exhibits 6–5 and 6–6 is impacted by all five of the uncertain variables which enter the model as low and high estimates. See Section VI.C of this preamble and Chapter 5, Section 5.2.4.2 of the final rule EA, for additional information on the variables that define the low and high cost scenarios. The CCT Operation and Maintenance (Existing) category in these exhibits are EPA's estimate of the ongoing cost of operating corrosion control at PWS where CCT was in place at the beginning of the period of analysis. Additional information on the estimation of CCT costs can be found in Chapter 5, section 5.3.3 of the final rule EA (USEPA, 2020a).

EXHIBIT 6–5—NATIONAL ANNUALIZED CORROSION CONTROL TECHNOLOGY COSTS—ALL PWS AT 3% DISCOUNT RATE

[2016$]

	Low cost estimate			High cost estimate		
	Previous LCR	Final LCRR	Incremental	Previous LCR	Final LCRR	Incremental
CCT Operations and Maintenance (Existing)	$327,171,000	$327,171,000	$0	$327,490,000	$327,490,000	$0
CCT Related Sanitary Survey and Source or Treatment Change Notification Activities	1,356,000	1,735,000	379,000	1,355,000	1,719,000	363,000
CCT Installation	13,424,000	7,138,000	−6,286,000	41,261,000	19,392,000	−21,869,000
CCT Installation Ancillary Activities	43,000	122,000	80,000	119,000	754,000	635,000
CCT Re-Optimization (Due to ALE)	2,479,000	6,575,000	4,096,000	15,374,000	33,425,000	18,051,000
CCT Re-Optimization Ancillary Activities (Due to ALE)	11,000	1,449,000	1,438,000	81,000	27,261,000	27,180,000
CCT Re-Optimization (Due to TLE)	0	5,452,000	5,452,000	0	20,724,000	20,724,000
CCT Re-Optimization Ancillary Activities (Due to TLE)	0	98,000	98,000	0	444,000	444,000
Find and Fix Installation	0	8,271,000	8,271,000	0	31,688,000	31,688,000
Find and Fix Ancillary Activities	0	5,884,000	5,884,000	0	8,190,000	8,190,000
Total Annual Corrosion Control Technology Costs	344,483,000	363,894,000	19,412,000	385,681,000	471,087,000	85,407,000

EXHIBIT 6–6—NATIONAL ANNUALIZED CORROSION CONTROL TECHNOLOGY COSTS—ALL PWS AT 7% DISCOUNT RATE
[2016$]

	Low cost estimate			High cost estimate		
	Previous LCR	Final LCRR	Incremental	Previous LCR	Final LCRR	Incremental
CCT Operations and Maintenance (Existing)	$306,521,000	$306,521,000	$0	$306,822,000	$306,822,000	$0
CCT Related Sanitary Survey and Source or Treatment Change Notification Activities	1,293,000	1,662,000	368,000	1,293,000	1,641,000	348,000
CCT Installation	12,499,000	6,623,000	−5,876,000	40,703,000	18,919,000	−21,783,000
CCT Installation Ancillary Activities	57,000	168,000	111,000	160,000	1,034,000	875,000
CCT Re-Optimization (Due to ALE)	2,299,000	5,664,000	3,365,000	15,724,000	33,041,000	17,317,000
CCT Re-Optimization Ancillary Activities (Due to ALE)	15,000	1,913,000	1,898,000	107,000	35,996,000	35,888,000
CCT Re-Optimization (Due to TLE)	0	4,784,000	4,784,000	0	20,888,000	20,888,000
CCT Re-Optimization Ancillary Activities (Due to TLE)	0	140,000	140,000	0	633,000	633,000
Find and Fix Installation	0	6,986,000	6,986,000	0	29,911,000	29,911,000
Find and Fix Ancillary Activities	0	5,848,000	5,848,000	0	8,668,000	8,668,000
Total Annual Corrosion Control Technology Costs	322,684,000	340,307,000	17,623,000	364,809,000	457,554,000	92,745,000

4. Lead Service Line Inventory and Replacement Costs

The LCR revisions require all water systems to create an LSL materials inventory during the first three years after rule promulgation or demonstrate to the state and make publicly available the information that the water system does not have LSLs. Because many water systems have already complied with state inventory requirements (*e.g.,* Michigan, see *https://www.michigan.gov/documents/egle/egle-dwehd-PDSMISummaryData_682673_7.pdf*) that are at least as stringent as those required under the LCRR, EPA adjusted the likelihood of conducting a new inventory to reflect state requirements. Water system inventory costs also reflect the development, by all water systems with LSLs, of an initial LSLR plan. The LSLR plan would include a strategy for determining the composition of ''lead status unknown'' service lines in its inventory, procedures to conduct full LSLR, a strategy for informing customers before a full or partial LSLR, a LSLR goal rate in the event of a lead trigger level exceedance for systems serving more than 10,000 persons, a procedure for customers to flush service lines and premise plumbing of particulate lead, a LSLR prioritization strategy, and a funding strategy for conducting LSLR.

Depending on a water system's 90th percentile lead tap sample value, it may be required to initiate an LSLR program. Small CWSs, serving 10,000 or fewer persons, and NTNCWSs have flexibility in the selection of a compliance option if the trigger or action levels are exceeded. These water systems may elect to implement either the LSLR, CCT, or POU compliance options. See section III.E of this preamble for additional information on the compliance alternatives available to small CWSs and NTNCWSs. Under both the low and high cost scenarios, the model estimates the cost for implementing LSLR, CCT, and POU for each water system that meets the small water system flexibility criteria and maintains only the cost associated with the least costly option for each system. The cost model under both the low and high cost scenarios applies the estimated LSLR costs to those CWSs serving 10,000 or fewer persons and any NTNCWSs for which the LSLR option is determined to be the least cost compliance alternative. Systems where CCT or POU are found to be less costly compliance alternatives than LSLR do not receive LSLR costs in the model. See section VI.D.5 of this preamble for a discussion of the modeling and a summary of the number of systems selecting each alternative compliance option.

Prompted by public comment on the proposed rule indicating that the Agency should utilize new LSLR unit cost data that has recently become available, EPA collected information from state and system websites, and media reports. The dataset provides costs estimates across full, customer-side, and system-side replacements from 38 systems that have publicly reported actual replacement costs from pilot studies and recent or on-going LSLR projects. This dataset, though more representative of current unit costs than the survey data used for the proposed rule analysis, still has a small number of observations and is an opportunity sample based on public availability of the information and was not collected using a systematic sampling technique that would allow for a statistical assessment of representativeness. The resultant estimates of replacement costs based on these data are uncertain. Therefore, EPA developed low- and high-end LSLR cost values that are used in the cost model to provide a low/high cost range to inform the understanding of uncertainty (*note:* Four other factors used to produce the low and high cost estimates also influence the LSLR total cost estimates). EPA uses the 25th and 75th percentile values from the new dataset to develop the low/high unit costs for utility-side, customer-side, and full LSLR. These values are larger than those used in the proposed rule analysis except for full replacement in the high cost scenario. See Chapter 5, Section 5.3.4.3 and Appendix A, Section 2 of the final rule EA (USEPA, 2020a) for more information on the development of the LSLR unit cost range.

LSLR cost includes not only the physical replacement of the service line but also the development and distribution of LSLR program outreach materials; contacting customers and site visits to confirm service line material and site conditions before replacement; providing customers with flushing procedures following a replacement; delivering pitcher filters and cartridges concurrent with the LSLR, and maintenance for six months; collecting and analyzing a tap sample three to six months after the replacement of an LSL and informing the customer of the results; and, reporting program results to the state.

Under the final rule, water systems with a 90th percentile lead tap sample value greater than 10 µg/L and less than or equal to 15 µg/L are considered to have a trigger level exceedance. These water systems are required to develop and implement a ''goal-based'' LSLR program where the annual replacement goal is set locally through a water system and state determination process. This program is required to operate for at least two annual monitoring periods after the system's lead 90th percentile tap sample has returned to levels at or below the trigger level. Ancillary costs

incurred by these water systems include the development and delivery of outreach materials to known and potential LSL households and submitting annual reports to the state on program activities. For water systems that do not meet the annual ''goal-based'' replacement rate, the final rule requires that additional outreach to LSL customers and other consumers be conducted. The additional outreach conducted is determined in conjunction with the state and is progressive, increasing when a water system misses an additional annual goal.

The Final LCRR provides compliance flexibility to water systems with 90th percentile tap sample data that exceeds 15 µg/L (the lead action level). These systems are required to implement a mandatory LSLR program replacing a rolling 2 year average of 3% per year using a baseline number of LSLs equal to the number of LSLs and galvanized requiring replacement service lines at the time the system first exceeds the lead trigger or action level plus the number of unknowns at the beginning of each year of the system's LSLR program. This rolling average allows systems that experience LSLR rate fluctuation to still meet a 3% replacement rate on average for the prior two year period every year the water system is required to implement the LSLR program. The regulation also requires that a cumulative number of replacements be reached equal to 3% of the sum of known lead, galvanized requiring replacement, and lead status unknown service lines in the initial inventory, times the number of years that elapsed between the system's first ALE and the date on which the system's 90th percentile lead levels are at or below the action level for 2 years (four consecutive 6-month monitoring periods). EPA does not have information on the annual variation in replacement rates which systems may experience when required to conduct mandatory replacement, therefore, the Agency has assumed an annual replacement rate of 3% (which equals a 3% rolling average value across all two year time periods). EPA's costs capture all estimated replacements required under the rule, but because the assumed 3% annual rate may not capture the year to year variation in LSL replacement rate. EPA's estimated discounted costs may be under or over estimated.

The LCRR also requires that CWSs replace the water system-owned portion of an LSL in response to receiving notification that a customer-owned portion of an LSL was replaced at the customer's initiative. The Agency developed new data in response to comments received on the proposed rule which allowed for the estimation of this category of LSLR costs for the final rule. The inclusion of this new cost category will increase the estimated LSLR costs in the final rule analysis relative to the methodology used in the proposed rule analysis. EPA assumes that all customer initiated LSLRs that occur in systems with trigger level or action level exceedances count toward the goal-based and mandatory removal targets and costs for those programs. EPA estimated costs for customer initiated LSLR are based on only those replacements estimated to occur at systems that are at or below the trigger level.

Exhibits 6–7 and 6–8 show the estimated annualized national cost for both the low and high cost scenarios, discounted at 3 and 7 percent, respectively, of water systems developing the LSL inventory, water systems conducting the goal-based and mandatory LSLR programs, costs to CWSs for removing their portion of an LSL after receiving notification that a customer-owned portion of an LSL was replaced outside of a water system replacement program and household removal costs for the customer-owned portion of the LSL under the previous LCR, the final LCRR, and the incremental cost. EPA did not estimate costs to households of replacing the customer-owned portion of an LSL outside of a goal-based or mandatory program because these replacements do not occur in response to these LCR revisions. Detailed information on the estimation of LSLR costs can be found in Chapter 5, section 5.3.4 of the final rule EA (USEPA, 2020a).

EXHIBIT 6–7—NATIONAL ANNUALIZED LEAD SERVICE LINE REPLACEMENT COSTS—ALL PWS AT 3% DISCOUNT RATE

[2016$]

	Low cost estimate			High cost estimate		
	Previous LCR	Final LCRR	Incremental	Previous LCR	Final LCRR	Incremental
Lead Service Line Inventory	$0	$6,318,000	$6,318,000	$0	$10,109,000	$10,109,000
System Lead Service Line Replacement Plan	0	304,000	304,000	0	395,000	395,000
System Lead Service Line Replacement (Mandatory)	600,000	15,550,000	14,950,000	26,777,000	62,417,000	35,641,000
Lead Service Line Replacement Ancillary Activities (Mandatory)	27,000	1,087,000	1,060,000	500,000	3,383,000	2,882,000
System Lead Service Line Replacement (Goal Based)	0	6,298,000	6,298,000	0	22,580,000	22,580,000
Lead Service Line Replacement Ancillary Activities (Goal Based)	0	755,000	755,000	0	1,524,000	1,524,000
Activities Triggered by Not Meeting Goal	0	6,087,000	6,087,000	0	19,663,000	19,663,000
System Lead Service Line Replacement (Customer-initiated)	0	6,943,000	6,943,000	0	18,946,000	18,946,000
System Lead Service Line Replacement Ancillary Activities (Customer-initiated)	0	1,030,000	1,030,000	0	1,224,000	1,224,000
Total Annual PWS Lead Service Replacement Costs	628,000	44,372,000	43,744,000	27,277,000	140,242,000	112,965,000
Household Lead Service Line Replacement (Mandatory)	182,000	0	−182,000	5,466,000	0	−5,466,000
Household Lead Service Line Replacement (Goal based)	0	8,100,000	8,100,000	0	19,542,000	19,542,000
Total Annual Lead Service Replacement Costs	810,000	52,472,000	51,662,000	32,743,000	159,784,000	127,041,000

EXHIBIT 6–8—NATIONAL ANNUALIZED LEAD SERVICE LINE REPLACEMENT COSTS—ALL PWS AT 7% DISCOUNT RATE
[2016$]

	Low cost estimate			High cost estimate		
	Previous LCR	Final LCRR	Incremental	Previous LCR	Final LCRR	Incremental
Lead Service Line Inventory	$0	$6,863,000	$6,863,000	$0	$10,593,000	$10,593,000
System Lead Service Line Replacement Plan	0	467,000	467,000	0	607,000	607,000
System Lead Service Line Replacement (Mandatory)	638,000	16,681,000	16,044,000	37,623,000	79,869,000	42,246,000
Lead Service Line Replacement Ancillary Activities (Mandatory)	29,000	1,249,000	1,220,000	704,000	4,438,000	3,734,000
System Lead Service Line Replacement (Goal Based)	0	6,676,000	6,676,000	0	28,204,000	28,204,000
Lead Service Line Replacement Ancillary Activities (Goal Based)	0	824,000	824,000	0	1,956,000	1,956,000
Activities Triggered by Not Meeting Goal	0	6,636,000	6,636,000	0	25,589,000	25,589,000
System Lead Service Line Replacement (Customer-initiated)	0	6,442,000	6,442,000	0	17,189,000	17,189,000
System Lead Service Line Replacement Ancillary Activities (Customer-initiated)	0	965,000	965,000	0	1,118,000	1,118,000
Total Annual PWS Lead Service Replacement Costs	667,000	46,803,000	46,136,000	38,327,000	169,562,000	131,235,000
Household Lead Service Line Replacement (Mandatory)	193,000	0	−193,000	7,681,000	0	−7,681,000
Household Lead Service Line Replacement (Goal based)	0	8,587,000	8,587,000	0	24,409,000	24,409,000
Total Annual Lead Service Replacement Costs	860,000	55,389,000	54,529,000	46,008,000	193,971,000	147,963,000

5. Point-of-Use Costs

Under the final rule requirements, small CWSs, serving 10,000 or fewer persons, and NTNCWSs with a 90th percentile lead value above the action level of 15 µg/L may choose between LSLR, CCT installation, or POU device installation and maintenance. See section III.E of this preamble for additional information on the compliance alternatives available to small CWSs and NTNCWSs. In addition to the cost to provide and maintain POU devices, water systems selecting the POU compliance option face additional ancillary costs in the form of: (1) POU implementation planning for installation, maintenance, and monitoring of the devices, (2) educating customers on the proper use of the POU device, (3) sampling POU devices to insure the device is working correctly, and (4) coordination with, obtaining approvals from, and annual reporting to the state.

The cost model applies these POU costs to those CWS serving 10,000 or fewer persons and any NTNCWSs for which the POU option is estimated to be the least cost compliance alternative. The determination of the least cost compliance alternative is computed across each representative model PWS in the cost model based on its assigned characteristics including: The number of LSLs, cost of LSLR, the presence of corrosion control, the cost and effectiveness of CCT, the starting of WQP monitoring, the number of entry points, the unit cost of POU, and the number of households. For a more complete discussion on the assignment of system characteristics, see section VI.C of this preamble and Chapters 4 and 5 of the final rule EA. These characteristics are the primary drivers in determining the costs once a water system has been triggered into CCT installation or re-optimization, LSLR, or POU provisions. The model estimates the net present value for implementing each compliance alternative and selects the least cost alternative to retain in the summarized national rule costs.

EPA estimated low and high cost scenarios, to characterize uncertainty in the cost model results. These scenarios are functions of assigning different low and high input values to a number of the variables that affect the relative cost of the small system compliance choices (see Chapter 5 section 5.2.4.2 of the final rule EA for additional information on uncertain variable value assignment). Therefore, as the model output shows, the choice of compliance technology is different across the low and high cost scenarios.

Exhibits 6–9 and 6–10 show the total number of CWSs serving 10,000 or fewer persons and NTNCWSs, the total number of systems by type and population size that would select one of the small system compliance options, the number of NTNCWSs selecting each compliance alternative in the model, and the number of CWSs by population size selecting each compliance alternative in the model, under both the low and high cost scenarios. The POU device implementation seems to be the least cost alternative when the number of households in the system is low as demonstrated by the decrease in the selection of the POU option as CWS population size increases in the model. Given the centralized nature of CCT, requiring installation and maintenance only at the drinking water treatment plant, this compliance technology can benefit from economies of scale. Therefore, the installation of CCT becomes more cost effective as system population size increases. The pattern seen in the selection of LSLR between the low and high cost scenarios demonstrates that the choice of compliance by small systems is driven by relative costs. Under the low cost scenario larger percentages of systems select LSLR given the assumed lower numbers of LSLs per system and lower cost of replacement under this scenario.

EXHIBIT 6–9—NTNCWS AND SMALL CWS COUNTS IMPACTED UNDER FLEXIBILITY OPTION—LOW COST SCENARIO
[Over 35 year period of analysis]

	NTNCWS	CWS				
	All systems	≤100	101–500	501–1,000	1,001–3,300	3,301–10,000
Total PWS Count in System Size Category	17,589	12,046	15,307	5,396	8,035	4,974
Total PWS Count of Systems with LSLR, POU, or CCT activity	714	641	910	314	418	257

EXHIBIT 6–9—NTNCWS AND SMALL CWS COUNTS IMPACTED UNDER FLEXIBILITY OPTION—LOW COST SCENARIO—Continued

[Over 35 year period of analysis]

	NTNCWS	CWS				
	All systems	≤100	101–500	501–1,000	1,001–3,300	3,301–10,000
Number of PWSs with Lead Service Line Removals	48	274	330	74	29	2
Number of PWSs that Install CCT	4	4.33	232	134	155	82
Number of PWSs that Re-optimize CCT	25	2	144	101	234	173
Number of PWSs that Install POU	637	361	205	4	1	

EXHIBIT 6–10—NTNCWS AND SMALL CWS COUNTS IMPACTED UNDER FLEXIBILITY OPTION—HIGH COST SCENARIO

[Over 35 year period of analysis]

	NTNCWS	CWS				
	All systems	≤100	101–500	501–1,000	1,001–3,300	3,301–10,000
Total PWS Count in System Size Category	17,589	12,046	15,307	5,396	8,035	4,974
Total PWS Count of Systems with LSLR, POU, or CCT activity	1,407	1,362	2,029	877	1,475	894
Number of PWSs with Lead Service Line Removals	56	59	40	8	50	10
Number of PWSs that Install CCT	7	1	346	284	349	178
Number of PWSs that Re-optimize CCT	21	20	381	542	1,072	704
Number of PWSs that Install POU	1,322	1,283	1,261	42	4	2

The estimated national annualized point-of-use device installation and maintenance costs for the final rule, under the low cost scenario, are $3,418,000 at a 3 percent discount rate and $3,308,000 at a 7 percent discount rate. The POU costs of the LCRR for the high cost scenario are $20,238,000 discounted at 3 percent and $19,928,000 discounted at 7 percent. Since POU costs are zero under the previous LCR, the incremental costs range from $3,418,000 to $20,238,000 at a 3 percent discount rate and from $3,308,000 to $19,928,000 at a 7 percent discount rate, under the low and high cost scenarios respectively. Additional information on the estimation of POU costs can be found in Chapter 5, section 5.3.5 of the final rule EA (USEPA, 2020a).

6. Public Education and Outreach Costs

In addition to the previous LCR public education requirements for water systems with a lead action level exceedance, the cost model includes final rule requirements for ongoing lead education that apply to all water systems and actions specifically for systems with LSLs, regardless of the 90th percentile level, and requirements in response to a single lead tap sample exceeding 15 µg/L.

The rule requires a number of updates to existing public education and additional outreach activities associated with LSLs. The public education requirements costed for all water systems, regardless of their lead 90th percentile tap sample levels, include: (1) Updating Consumer Confidence Report language, (2) developing a lead outreach plan and materials for new customers, (3) developing an approach for improved public access to lead information, (4) providing increased information on lead in drinking water to state and local health departments, and (5) providing annual documentation and certification to the state that public outreach on lead has been completed. The cost of LCR public education requirements applying to all water systems with LSLs are: (1) The planning, initially implementing and maintaining customer and public access to LSL location and tap sampling data information, and (2) the development of lead educational materials for water-related utility work and delivery of those materials to affected households during water-related work that could result in service line disturbance.

The LCRR public education costs that are applied to water systems that exceed the 15 µg/L action level include: (1) The development of lead language for public education in response to a lead action level exceedance, (2) delivery of education materials to customers for CWSs and posting of lead information for NTNCWSs, (3) water systems contacting public health agencies to obtain a list of additional community organizations that should receive public education materials, (4) water systems notifying public health agencies and other community organizations, (5) large water systems posting a lead notice on their website, (6) water system issuing a press release, (7) community water systems consulting with the state on the materials development and appropriate activities while the action level is exceeded, and (8) annually certifying public education activities have been completed.

The rule also includes a requirement for water systems to notify affected customers as soon as practicable but no later than 3 days of becoming aware of an individual lead tap sample exceeding the 15 µg/L. The model includes the development cost of the notification and education materials to be delivered to affected households and the incremental cost of expedited delivery of the notification. In developing this cost, EPA assumed systems would contact customers by phone and NTNCWSs would email and post sample results. Note that materials costs related to follow-up testing when a sample exceeds 15 µg/L are included in the tap sampling costs in section VI.D.2 of this preamble. The estimated annualized national water system public education and outreach costs for the previous LCR range from $345,000 to $1,467,000 at a 3 percent discount rate under the low and high cost scenarios respectively. At a 7 percent discount rate, the annualized estimated previous rule PE cost range is from $471,000 to $2,016,000. Under the LCRR low cost scenario, the estimated impacts are $37,207,000 at a 3 percent discount rate and $36,555,000 at a 7 percent discount rate. Under the high scenario the estimated annualized costs are $45,461,000 at a 3 percent discount rate and $45,628,000 at a 7 percent discount rate. Therefore, the incremental estimated public education and outreach costs for water systems range from $36,861,000 to $43,994,000 at a 3 percent discount rate and $36,084,000 to $43,612,000 at a 7 percent discount

rate. See Chapter 5, section 5.3.6 of the final rule EA for additional detailed information on the estimation of public education and outreach costs (USEPA, 2020a).

7. Annualized per Household Costs

The cost model calculates the annualized cost per household, by first calculating the cost per gallon of water produced by the CWS. This cost per gallon represents the cost incurred by the system to comply with the requirements of the LCRR. This includes CCT cost, LSL inventory creation, system funded LSLR, tap sampling, public education, and administrative costs. Because of uncertainty in five important LCRR cost driver input variables, discussed in section VI.A. of this preamble, the Agency developed low and high cost scenarios. These scenarios produce a range in the estimated cost per gallon and two estimates for annualized per household costs.

The model multiplies this low and high scenario costs per gallon by the average annual household consumption (in gallons) to determine the cost per household per year associated with increased costs borne by the CWS. EPA then adds to both these values the low and high total consumer-side LSLR cost borne by households in the system, divided by the number of households served by the system, to derive the CWS's average annual household low and high scenario cost estimates. Exhibits 6–11 and 6–12 show the distributions of incremental annualized costs for CWS households by primary water source and size category. (Note that the percentiles represent the distribution of average household costs across CWSs in a category, not the distribution of costs across all households in a CWS category.) Some households that pay for a customer-side LSLR will bear a much greater annual household burden. EPA estimates the cost of removing the customer-owned side of a service line range from $2,514 to $3,929, with a central tendency of $3,559. The percentage of customers in each water system paying the higher customer-side LSL costs depends on the number of LSL in the water system, the rate of replacement, and the details of the water systems LSLR program.

EXHIBIT 6–11—ANNUALIZED INCREMENTAL COST PER HOUSEHOLD BY COMMUNITY WATER SYSTEM CATEGORY—LOW COST SCENARIO

[2016$]

Funding	Source water	Size	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Private	Ground	Less than 100	$5.36	$7.00	$11.32	$18.48	$26.40
Private	Ground	100 to 500	1.45	2.32	4.03	5.85	9.92
Private	Ground	500 to 1,000	0.44	0.54	0.68	0.95	2.18
Private	Ground	1,000 to 3,300	0.16	0.22	0.32	0.42	0.98
Private	Ground	3,300 to 10,000	0.25	0.31	0.45	0.64	1.96
Private	Ground	10,000 to 50,000	0.04	0.06	0.09	0.34	0.72
Private	Ground	50,000 to 100,000	0.05	0.06	0.10	0.31	0.34
Private	Ground	100,000 to 1,000,000	0.03	0.04	0.10	0.26	0.31
Private	Surface	Less than 100	4.96	7.39	12.05	19.57	34.61
Private	Surface	100 to 500	1.43	2.26	4.08	6.92	13.97
Private	Surface	500 to 1,000	0.40	0.51	0.78	1.68	3.49
Private	Surface	1,000 to 3,300	0.16	0.21	0.35	0.77	1.16
Private	Surface	3,300 to 10,000	0.23	0.31	0.49	1.57	2.45
Private	Surface	10,000 to 50,000	0.04	0.06	0.36	0.64	2.23
Private	Surface	50,000 to 100,000	0.03	0.05	0.19	0.30	1.26
Private	Surface	100,000 to 1,000,000	0.02	0.05	0.19	0.27	0.97
Private	Surface	Greater than 1,000,000	0.13	0.13	0.14	0.14	0.14
Public	Ground	Less than 100	3.83	4.95	8.27	14.29	21.12
Public	Ground	100 to 500	1.00	1.37	2.36	3.89	7.28
Public	Ground	500 to 1,000	0.32	0.39	0.51	0.93	1.95
Public	Ground	1,000 to 3,300	0.12	0.16	0.24	0.37	0.86
Public	Ground	3,300 to 10,000	0.20	0.26	0.36	0.52	1.63
Public	Ground	10,000 to 50,000	0.03	0.05	0.07	0.42	0.57
Public	Ground	50,000 to 100,000	0.04	0.05	0.21	0.26	0.28
Public	Ground	100,000 to 1,000,000	0.03	0.05	0.09	0.22	0.27
Public	Ground	Greater than 1,000,000	0.06	0.06	0.09	0.10	0.10
Public	Surface	Less than 100	3.48	6.44	12.26	22.00	29.05
Public	Surface	100 to 500	0.92	1.45	2.71	4.75	8.36
Public	Surface	500 to 1,000	0.31	0.39	0.60	1.28	2.65
Public	Surface	1,000 to 3,300	0.12	0.16	0.26	0.57	0.97
Public	Surface	3,300 to 10,000	0.21	0.27	0.40	1.32	1.94
Public	Surface	10,000 to 50,000	0.04	0.06	0.14	0.57	2.22
Public	Surface	50,000 to 100,000	0.03	0.06	0.24	0.31	1.10
Public	Surface	100,000 to 1,000,000	0.03	0.06	0.18	0.28	0.40
Public	Surface	Greater than 1,000,000	0.04	0.07	0.09	0.10	0.34

EXHIBIT 6–12—ANNUALIZED INCREMENTAL COST PER HOUSEHOLD BY COMMUNITY WATER SYSTEM CATEGORY—HIGH COST SCENARIO

[2016$]

Funding	Source water	Size	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Private	Ground	Less than 100	$ − 10.82	$6.65	$10.86	$18.53	$30.58
Private	Ground	100 to 500	1.28	2.31	4.31	6.81	17.50
Private	Ground	500 to 1,000	0.44	0.56	0.78	3.71	7.09
Private	Ground	1,000 to 3,300	0.17	0.25	0.36	1.15	2.66
Private	Ground	3,300 to 10,000	0.24	0.33	0.52	2.44	5.85
Private	Ground	10,000 to 50,000	0.05	0.07	0.10	0.49	1.45
Private	Ground	50,000 to 100,000	0.05	0.06	0.08	0.35	1.42

EXHIBIT 6–12—ANNUALIZED INCREMENTAL COST PER HOUSEHOLD BY COMMUNITY WATER SYSTEM CATEGORY—HIGH COST SCENARIO—Continued

[2016$]

Funding	Source water	Size	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Private	Ground	100,000 to 1,000,000	0.04	0.08	0.36	0.64	4.51
Private	Surface	Less than 100	3.72	6.49	15.93	30.31	69.90
Private	Surface	100 to 500	1.17	2.25	6.70	13.09	44.49
Private	Surface	500 to 1,000	0.37	0.61	3.15	4.78	19.00
Private	Surface	1,000 to 3,300	0.15	0.26	1.01	2.38	7.74
Private	Surface	3,300 to 10,000	0.17	0.37	1.96	3.35	9.98
Private	Surface	10,000 to 50,000	0.05	0.08	0.40	1.13	5.70
Private	Surface	50,000 to 100,000	0.03	0.05	0.13	0.39	2.54
Private	Surface	100,000 to 1,000,000	0.03	0.09	0.36	0.95	4.36
Private	Surface	Greater than 1,000,000	0.16	0.16	0.16	0.16	0.17
Public	Ground	Less than 100	−5.87	4.63	7.76	15.88	27.31
Public	Ground	100 to 500	0.96	1.41	2.65	6.26	14.49
Public	Ground	500 to 1,000	0.32	0.41	0.62	3.17	7.14
Public	Ground	1,000 to 3,300	0.12	0.17	0.29	1.04	3.33
Public	Ground	3,300 to 10,000	0.20	0.27	0.41	1.88	4.83
Public	Ground	10,000 to 50,000	0.04	0.06	0.08	0.40	1.60
Public	Ground	50,000 to 100,000	0.04	0.05	0.19	0.30	2.24
Public	Ground	100,000 to 1,000,000	0.04	0.06	0.30	0.44	3.97
Public	Ground	Greater than 1,000,000	0.08	0.08	0.10	0.10	0.10
Public	Surface	Less than 100	3.30	5.45	13.70	29.79	62.64
Public	Surface	100 to 500	0.90	1.47	4.85	10.08	34.08
Public	Surface	500 to 1,000	0.30	0.44	2.61	3.98	13.98
Public	Surface	1,000 to 3,300	0.12	0.20	0.83	1.63	5.51
Public	Surface	3,300 to 10,000	0.21	0.33	1.66	2.64	8.76
Public	Surface	10,000 to 50,000	0.05	0.07	0.38	1.08	5.11
Public	Surface	50,000 to 100,000	0.04	0.06	0.25	0.37	2.85
Public	Surface	100,000 to 1,000,000	0.04	0.08	0.37	0.97	4.42
Public	Surface	Greater than 1,000,000	0.04	0.08	0.09	0.12	0.61

8. Primacy Agency Costs

For each of the drinking water cost sections previously described, primacy agencies (*i.e.,* states) have associated costs. The first of these groupings is implementation and administrative costs which are associated with rule adoption, program development, coordinating with the EPA, modification of data systems and data entry, training for both state and PWS employees, and on-going technical assistance to systems. The next burden category specifically for states is the sampling related costs resulting from the review of sampling plans, communications materials, collected lead tap, water quality parameter, source water, and school and child care monitoring data/reports, and waiver and sample invalidation requests. CCT costs accruing to states come from consultations on and review of the selection process (including CCT studies) and installation or re-optimization of corrosion control technologies, the setting of optimal water quality parameters, and the consultation and review of actions taken in response to source water, treatment changes, and ''find-and-fix'' sample results. Other major drivers of state cost are the LSLR inventory and replacement activities. States assist systems in the development of their LSL inventories, review the completed inventories, LSLR plans and outreach materials, approve the goal-based replacement rate for a trigger level exceedance and determine additional activities for PWSs not meeting this goal-based rate, and annually review LSLR program reports and updates to the inventory. States review, consult, and approve CCT re-optimization when a PWS with CCT in place has a trigger level exceedance. States also review, consult, and approve the action level exceedance compliance approach that small CWSs serving 10,000 or fewer persons and NTNCWSs submit when the system exceeds the trigger level. The compliance choice set for these systems includes CCT installation or re-optimization, LSLR, or POU device installation. Costs incurred by states for CCT and LSLR are discussed above. For POU programs, state burden results from reviewing the POU implementation plan, outreach materials, annual tap site sampling plans, results, and certifications for customer notification, and annual required program reports. The final category of state costs assessed in the EPA model are those associated with the final rule's public education requirements. States must review new required CCR changes, outreach material to health departments, and PE materials for disturbances of lead service lines for CWSs with LSLs, galvanized requiring replacement, and service lines of unknown material. In the case of systems that exceed the lead action level the state must also review revisions to lead language in the tier-one public notification and consult on the other PE activities a system must conduct in response to the exceedance. States will also review the annual public education certification submissions from systems.

In EPA's cost model, the majority of the costs associated with states are determined on a per water system basis. State actions and costs are largely driven by the rule required actions that are triggered for the individual water systems. The exception to this rule is the implementation and administrative costs which are tallied on a per primacy agency basis. Unit cost values for the final LCRR were updated based on burden information from the Association of State Drinking Water Administrators' Costs of States Transactions Study (CoSTS) model (ASDWA, 2020). These updated unit cost values are substantially higher that those used in the proposed rule analysis. The per water system costs and per primacy agency costs are summed to obtain aggregate costs for this category.

The cost model estimates that primacy agencies will incur incremental estimated annualized costs, under the low cost scenario, totaling $19,707,000 at a 3 percent discount rate and $20,876,000 at a 7 percent discount rate. For the high cost scenario total estimated incremental cost is

$20,756,000 at a 3 percent discount rate and $22,216,000 at a 7 percent discount rate. Additional information on the estimation of primacy agency costs can be found in Chapter 5, section 5.4 of the final rule EA (USEPA, 2020a).

9. Costs and Ecological Impacts Associated With Additional Phosphate Usage

Adding orthophosphate creates a protective inner coating on pipes that can inhibit lead leaching. However, once phosphate is added to the public water system (PWS), some of this incremental loading remains in the water stream as it flows into wastewater treatment plants (WWTPs) downstream. This generates treatment costs for certain WWTPs. In addition, at those locations where treatment does not occur, water with elevated phosphorus concentrations may discharge to water bodies and induce certain ecological impacts.

To estimate the potential fate of the orthophosphate added at PWSs, EPA developed a conceptual mass balance model. EPA applied this conceptual model to estimate the increase in loading at WWTPs, given an initial loading from corrosion control at water treatment plants. WWTPs could incur costs because of upstream orthophosphate addition if they have permit discharge limits for phosphorus parameters. The percentage of WWTPs with phosphorus limits has increased over time. From 2007 to 2016, in annual percentage rate terms, the growth rate in the percentage of WWTPs with phosphorus limits is 3.3 percent (see Chapter 5, Section 5.5.1 of the Final Rule EA).

EPA assumed this increase would continue as states transition from narrative to numerical nutrient criteria and set numeric permits limits, especially for impaired waters. EPA applied the growth rate observed from 2007 to 2016 to estimate the anticipated percentage of WWTPs with phosphorus limits in future years. This growth rate results in an estimated 41 percent of WWTPs with phosphorus discharge limits after 35 years. Applied as the percentage of WWTPs that need to take treatment actions, this estimate is likely conservative, particularly given the potential availability of alternative compliance mechanisms, such as, individual facility variance and nutrient trading programs.

The specific actions a WWTP might need to take, if any, to maintain compliance with a National Pollution Discharge Elimination System (NPDES) phosphorus limit will depend on the type of treatment present at the WWTP and the corresponding phosphorus removal provided. Based on a review of NPDES data, it is likely that most of the WWTPs that already have phosphorus limits have some type of treatment to achieve the limit.

Some treatment processes can accommodate incremental increases in influent loading and still maintain their removal efficiency. Such processes might not need significant adjustment to maintain their existing phosphorus removal efficiency, given an incremental increase. Other treatment processes may need modifications to their design or operation to maintain their removal efficiency in the face of an influent loading increase.

EPA derived a unit cost of $4.59 per pound for removing incremental phosphorus (see Chapter 5, section 5.5.1 of the final rule EA for additional information). This unit cost includes the cost of additional chemical consumption and the operating cost of additional sludge processing and disposal. The costs a WWTP could incur depend on the magnitude of the loading increase relative to the specific WWTP's effluent permit limit. WWTPs, whose current discharge concentrations are closer to their limit, are more likely to have to act. WWTPs whose current concentrations are well below their limit may not incur costs but might, under certain conditions, incur costs (for example, when phosphorus removal achieved by technology is sensitive to incremental phosphorus loading increases). Furthermore, future phosphorus limits could be more stringent than existing limits in certain watersheds.

Therefore, EPA conservatively assumed that any WWTP with a discharge limit for phosphorus parameters could incur costs. Accordingly, in calculating costs, EPA used the anticipated percentage of WWTPs with phosphorus discharge limits as the likelihood that incremental orthophosphate loading from a drinking water system would reach a WWTP with a limit. EPA combined this likelihood and the unit cost (previously estimated) with incremental phosphorus loading to calculate incremental costs to WWTPs for each year of the analysis period. The incremental annualized cost that WWTPs would incur to remove additional phosphorous associated with the LCRR, under the low cost scenario, ranges from $1,152,000 to $1,458,000 at a 3 and 7 percent discount rate, respectively. The high cost scenario produced an incremental estimated impact of $1,828,000 using a 3 percent discount rate, and $2,607,000 at a 7 percent discount rate.

EPA estimates that WWTP treatment reduces phosphorus loads reaching water bodies by 59 percent but they are not eliminated. The rule's national-level total incremental phosphorus loads reaching water bodies are projected to grow over the period of analysis from the low/high scenario range of 161,000 to 548,000 pounds fifteen years after promulgation to the low/high scenario range of 355,000 to 722,000 pounds at year 35. See Chapter 5, section 5.5.2 of the final rule EA for information on how loading estimates are calculated. The ecological impacts of these increased phosphorous loadings are highly localized: Total incremental phosphorus loadings will depend on the amount and timing of the releases, characteristics of the receiving water body, effluent discharge rate, existing total phosphorus levels, and weather and climate conditions. Detailed spatially explicit information on effluents and on receiving water bodies does not exist in a form suitable for this analysis. Rather, to evaluate the potential ecological impacts of the rule, EPA evaluated the significance of the national-level phosphorus loadings compared to other phosphorous sources in the terrestrial ecosystem.

To put these phosphorus loadings in context, estimates from the U.S. Geological Survey (USGS) Spatially Referenced Regression On Watershed Attributes (SPARROW) model suggest that anthropogenic sources deposit roughly 750 million pounds of total phosphorus per year (USEPA, 2019b). The total phosphorus loadings from the LCRR high cost scenario would contribute about 1 percent (7 million/750 million) of total phosphorus entering receiving waterbodies in a given year, and the incremental amount of total phosphorus associated with the LCRR relative to the previous LCR grows only 0.1 percent (722,000/750 million). At the national level, EPA expects total phosphorus entering waterbodies as a result of the final LCR revisions to be small, relative to the total phosphorus load deposited annually from all other sources. National average load impacts may obscure localized ecological impacts in some circumstances, but the existing data do not allow an assessment as to whether this incremental load will induce ecological impacts in particular areas. It is possible, however, that localized impacts may occur in certain water bodies without restrictions on phosphate influents, or in locations with existing elevated phosphate levels.

An increase in phosphorus loadings can lead to economic impacts and undesirable aesthetic impacts. Excess

nutrient pollution can cause eutrophication—excessive plant and algae growth—in lakes, reservoirs, streams, and estuaries throughout the United States. Eutrophication, by inducing primary production, leads to seasonal decomposition of additional biomass, consuming oxygen and creating a state of hypoxia, or low oxygen, within the water body. In extreme cases, the low to no oxygen states can create dead zones, or areas in the water where aquatic life cannot survive. Studies indicate that eutrophication can decrease aquatic diversity for this reason (*e.g.,* Dodds et al. 2009). Eutrophication may also stimulate the growth of harmful algal blooms (HABs), or over-abundant algae populations. Algal blooms can harm the aquatic ecosystem by blocking sunlight and creating diurnal swings in oxygen levels because of overnight respiration. Such conditions can starve and deplete aquatic species.

10. Summary of Rule Costs

The estimated annualized low and high scenario costs, discounted at 3 percent and 7 percent, that PWSs, households, and primacy agencies will incur in complying with the previous LCR, the LCRR, and incrementally are summarized in Exhibits 6–13 and 6–14. The total estimated incremental annualized cost of the LCRR range from $161 to $335 million at a 3 percent discount rate, and $167 to $372 million at a 7 percent discount rate in 2016 dollars. The exhibits also detail the proportion of the annualized costs attributable to each rule component.

EXHIBIT 6–13—NATIONAL ANNUALIZED RULE COSTS—ALL PWS AT 3% DISCOUNT RATE
[2016$]

PWS annual costs	Low cost estimate			High cost estimate		
	Previous LCR	Final LCRR	Incremental	Previous LCR	Final LCRR	Incremental
Sampling	$41,962,000	$67,744,000	$25,782,000	$45,099,000	$78,739,000	$33,641,000
PWS Lead Service Line Replacement	628,000	44,372,000	43,744,000	27,277,000	140,242,000	112,965,000
Corrosion Control Technology	344,483,000	363,894,000	19,412,000	385,681,000	471,087,000	85,407,000
Point-of Use Installation and Maintenance	0	3,418,000	3,418,000	0	20,238,000	20,238,000
Public Education and Outreach	345,000	37,207,000	36,861,000	1,467,000	45,461,000	43,994,000
Rule Implementation and Administration	0	2,576,000	2,576,000	0	2,576,000	2,576,000
Total Annual PWS Costs	387,417,000	519,210,000	131,792,000	459,523,000	758,343,000	298,820,000
State Rule Implementation and Administration	6,145,000	25,852,000	19,707,000	7,137,000	27,893,000	20,756,000
Household Lead Service Line Replacement	182,000	8,100,000	7,918,000	5,466,000	19,542,000	14,076,000
Wastewater Treatment Plant Costs	161,000	1,313,000	1,152,000	695,000	2,523,000	1,828,000
Total Annual Rule Costs	393,904,000	554,475,000	160,571,000	472,821,000	808,301,000	335,481,000

EXHIBIT 6–14—NATIONAL ANNUALIZED RULE COSTS—ALL PWS AT 7% DISCOUNT RATE
[2016$]

PWS annual costs	Low cost estimate			High cost estimate		
	Previous LCR	Final LCRR	Incremental	Previous LCR	Final LCRR	Incremental
Sampling	$40,890,000	$70,197,000	$29,307,000	$45,164,000	$84,407,000	$39,243,000
PWS Lead Service Line Replacement	667,000	46,803,000	46,136,000	38,327,000	169,562,000	131,235,000
Corrosion Control Technology	322,684,000	340,307,000	17,623,000	364,809,000	457,554,000	92,745,000
Point-of Use Installation and Maintenance	0	3,308,000	3,308,000	0	19,928,000	19,928,000
Public Education and Outreach	471,000	36,555,000	36,084,000	2,016,000	45,628,000	43,612,000
Rule Implementation and Administration	0	4,147,000	4,147,000	0	4,147,000	4,147,000
Total Annual PWS Costs	364,711,000	501,316,000	136,605,000	450,316,000	781,224,000	330,908,000
State Rule Implementation and Administration	6,073,000	26,949,000	20,876,000	7,429,000	29,645,000	22,216,000
Household Lead Service Line Replacement	193,000	8,587,000	8,393,000	7,681,000	24,409,000	16,728,000
Wastewater Treatment Plant Costs	211,000	1,669,000	1,458,000	1,097,000	3,705,000	2,607,000
Total Annual Rule Costs	371,188,000	538,521,000	167,333,000	466,523,000	838,983,000	372,460,000

E. Benefits Analysis

The final LCRR is expected to result in significant health benefits, since both lead and copper are associated with adverse health effects. Lead is a highly toxic pollutant that can damage neurological, cardiovascular, immunological, developmental, and other major body systems. EPA is particularly concerned about ongoing exposure experienced by children because lead can affect brain development. Additionally, children through their physiology and water ingestion requirements may be at higher risk. Research shows that, on average, formula-fed infants and young children consume more drinking water per day on a body weight basis than adolescents. Using the USDA Continuing Survey of Food Intakes by Individuals (CSFII) data, Kahn and Stralka (2009) demonstrated this trend, is most pronounced in children under 1 year of age who drink more than double older children and adults per kg of body weight. Additionally, children absorb 2–4 times more lead than adults through the gastrointestinal tract ((Mushak, 1991, WHO, 2011, and Ziegler et al., 1978). No safe level of lead exposure has been identified (USEPA, 2013). EPA's health risk reduction and benefits assessment of the LCR revisions concentrates on quantification and monetization of the estimated impact of reductions in lead exposure on childhood IQ. As explained in Appendix D of the final rule Economic

Analysis (USEPA 2020a), there are additional non-quantified lead health impacts to both children and adults that will be realized as a result of this rulemaking.

Although copper is an essential element for health, excess intake of copper has been associated with several adverse health effects. Most commonly, excess exposure to copper results in gastrointestinal symptoms such as nausea, vomiting, and diarrhea (National Research Council, 2000). In susceptible populations, such as children with genetic disorders or predispositions to accumulate copper, chronic exposure to excess copper can result in liver toxicity. Because household level data on the change in copper concentrations that result from changes in CCT are not available, this analysis does not quantify any potential benefits from reduced copper exposure that may result from the rule. See Appendix E in the final rule EA for additional copper health impact information.

To quantify the potential impact to exposed populations of changes in lead tap water concentrations as a result of the LCR revisions, EPA:

- Utilized sample data from 15 cities representing 14 water systems from across the United States and Canada to estimate potential household lead tap water concentrations under various levels of corrosion control treatment, LSLR, and implementation of POU devices;
- Modeled exposure using the lead tap water concentration data estimated from the 15 city sampling data, information on peoples' water consumption activities, and background lead levels from other potential pathways;
- Derived the potential change in BLLs that result from the changes in drinking water lead exposure;
- Used concentration response functions, from the scientific literature, to quantify estimated changes in IQ for children given shifts in BLLs;
- Estimated the unit value of a change in childhood IQ; and
- Applied the unit values to the appropriate demographic groups experiencing changes in lead tap water concentrations as a result of the regulatory changes across the period of analysis.

Subsections VI.E.1 through 4 of this preamble outline the estimation of lead concentration values in drinking water used to estimate before and after rule revision implementation concentration scenarios, the corresponding estimated avoided IQ loss in children, and a summary of the monetized benefits of the LCRR.

1. Modeled Drinking Water Lead Concentrations

EPA determined the lead concentrations in drinking water at residential locations through the collection and analysis of consecutive sampling data representing homes pre and post removal of LSLs, including partial removal of LSLs, under differing levels of water system corrosion control treatment. The data was collected from multiple sources including water systems, EPA Regional Offices and the Office of Research and Development, and authors of published journal articles (Deshommes et al., 2016). This data includes lead concentrations and information regarding LSL status, location, and date of sample collection, representing 18,039 samples collected from 1,638 homes in 15 cities representing 14 city water systems across the United States and Canada. EPA grouped the samples into LSL status categories (''LSL,'' ''Partial,'' ''No LSL''). Samples were also grouped by CCT treatment, assigning status as having ''None,'' ''Partial,'' or ''Representative.'' ''Partial'' includes those water systems with some pH adjustment and lower doses of a phosphate corrosion inhibitor, but this treatment is not optimized. ''Representative'' are those water systems in the dataset that have higher doses of phosphate inhibitors, which in the model are considered optimized (see the final rule EA Chapter 6, section 6.2.1 for additional detail and docket number EPA–HQ–OW–2017–0300 for the data).

In response to comments received by the Agency, the city assignments to CCT groupings were updated between the proposed and final rules. EPA reviewed the CCT designations made in the dataset and changed the designations for Halifax, Cincinnati before 2006, and Providence/Cranston.

EPA fit several regression models (see the final rule EA Chapter 6, section 6.2.2 for additional detail) of tap water lead concentration as predicted by LSL presence (''LSL'' or ''No LSL''), LSL extent (''Partial''), CCT status, and ''profile liter.'' Profile liter is the cumulative volume a sample represented within a consecutive sampling series at a single location and time. Models to describe the profile liter accounted for the variation among sampling events, sampling sites, and city. The water lead concentrations exhibited a right-skewed distribution; therefore, the variable was log-transformed to provide a better modeled fit of the data. EPA selected one of the regression models based on its fit and parsimony and used it to produce simulated lead concentrations for use in the benefits analysis (Exhibit 6–8, in Chapter 6 of the final rule EA). The selected model suggests that besides water system, residence, and sampling event, the largest effects on lead concentration in tap water come from the presence of LSLs and the number of liters drawn since the last stagnation period. CCT produces smaller effects on lead concentration than LSLs, and these effects are larger in homes with LSLs.

To statistically control for some sources of variability in the input data, EPA did not use summary statistics from the original data directly in estimating the effects of LSL and CCT status. Instead, EPA produced simulated mean lead concentrations for 500,000 samples, summarized in Exhibit 6–15, based on the selected regression model. The simulations were performed on the log-scale to conform to the fitted model (which used a log-transformed water lead concentration variable) and converted to the original scale to produce geometric means and geometric standard-deviations. Geometric means are more representative of the central tendency of a right-skewed distribution than are arithmetic means and prevent overestimation of the impact of water lead levels on estimated blood lead levels and resulting IQ and benefits values. The simulated sample concentrations represent estimates for new cities, sites, and sampling events not included in the original dataset. These simulations rely on estimates of variability and uncertainty from the regression model and given information on LSL and CCT status. Individual estimates are best thought of as the central tendency for a lead tap sample concentration given regression model parameters and estimated variance. The simulated samples represent, on average, the lead concentrations taken after a short flushing period of roughly 30 seconds for all combinations of LSL and CCT status. This represents a point near the average peak lead concentration for homes with full or partial LSLs, and a point slightly below the peak lead concentration for homes with no LSLs, regardless of CCT status.

EPA estimates that improving CCT will produce significant reductions in lead tap water concentration overall. However, for full LSLRs, the final model produced predictions of drinking water concentrations that overlapped almost completely for all CCT conditions. Therefore, EPA used the pooled estimate of predicted drinking water concentrations for all CCT conditions in residences with no LSL in place for the

main analysis in Chapter 6 of the final rule EA.

Because small CWSs, that serve 10,000 or fewer persons, have flexibility in the compliance option they select in response to a lead action level exceedance, some CWSs are modeled as installing POU devices at all residences. See section III.E of this preamble for additional information on the compliance alternatives available to small CWSs. For individuals in these systems, EPA assumed, in the analysis, that consumers in households with POU devices are exposed to the same lead concentration as residents with ''No LSL'' and ''Representative'' CCT in place.

Note that the simulated concentrations for the final rule analysis, in Exhibit 6–15, have increased lead concentrations for the ''no-LSL'' scenarios and lower lead concentrations for the cases where full and partial LSLs are present and there is no or partial CCT present as compared to the estimated values used in the proposed rule analysis. These changes from the proposal will result in lower estimated changes in BLLs for both children and adults as a result of LSLR and improvements in CCT. Estimated IQ benefit for children will also decrease for a change in treatment of LSLR as compared to the proposed rule values.

EXHIBIT 6–15—LSL AND CCT SCENARIOS AND SIMULATED GEOMETRIC MEAN TAP WATER LEAD CONCENTRATIONS AND STANDARD DEVIATIONS AT THE FIFTH LITER DRAWN AFTER STAGNATION FOR EACH COMBINATION OF LSL AND CCT STATUS

LSL status	CCT status	Simulated mean of log lead (µg/L)	Simulated SD[a] of log lead (µg/L)	Simulated geometric mean lead (µg/L)	Simulated geometric SD[a] of lead
LSL	None	2.89	1.33	18.08	3.78
Partial	None	2.13	1.33	8.43	3.77
No LSL	None	[b] **−0.19**	[b] **1.35**	[b] **0.82**	[b] **3.86**
LSL	Partial	2.29	1.33	9.92	3.78
Partial	Partial	1.55	1.32	4.72	3.75
No LSL	Partial	[b] **−0.19**	[b] **1.35**	[b] **0.82**	[b] **3.86**
LSL	Representative	1.70	1.33	5.48	3.77
Partial	Representative	0.97	1.32	2.64	3.76
No LSL	Representative	[b] **−0.19**	[b] **1.35**	[b] **0.82**	[b] **3.86**

[a] Standard deviations reflect ''among-sampling event'' variability.
[b] Bolded values show how simulated results were pooled to produce a common estimate for homes with no LSL across CCT conditions.

In the estimation of the costs and benefits of the LCR revisions, each modeled person within a water system is assigned to one of the estimated drinking water concentrations in Exhibit 6–15, depending on CCT, POU, and LSL status. EPA estimated benefits under both the low cost and high cost scenarios used in the LCRR analysis to characterize uncertainty in the cost estimates.The low cost scenario and high cost scenario differ in their assumptions made about: (1) The existing number of LSLs in PWSs; (2) the number of PWS above the AL or TL under the previous and final rule monitoring requirements; (3) the cost of installing and/or re-optimizing corrosion control treatment (CCT);(4) the effectiveness of CCT in mitigating lead concentrations; and (5) the cost of LSLR (Section VI.C above and Chapter 5, section 5.2.4.2 of the final rule EA (USEPA, 2020a)). EPA predicted the status of each system under the low and high scenarios at baseline (prior to rule implementation) and in each year of rule implementation. Depending on the timing of required actions that can change CCT, POU, and LSL status under both the baseline and LCRR low and high scenario model runs, changes in lead concentration and resultant blood lead are predicted every year for the total population served by the systems for the 35-year period of analysis. In the primary benefits analysis for the final rule, improvements to CCT and the use of installed POU devices are only predicted for individuals in households with LSLs prior to implementation of the LCRR requirements (consistent with discussion above about the limits of the data for predicting the impact of CCT when LSL are not present). In the model, LSL removals are predicted by water system, by year, and multiplied by the average number of persons per household (across demographic categories) to determine the number of people shifting from one LSL status to another. To predict the changes in exposure that result from an improvement in CCT, EPA predicts the entire LSL population of a water system will move to the new CCT status at the same time. EPA also assumes that the entire water system moves to the drinking water lead concentration, assigned to POU when this option is implemented, which implies that everyone in households in a distribution system with LSLs is properly using the POU. See Chapter 6, section 6.3 of the final rule EA (USEPA, 2020a) for more detailed information on the number of people switching lead concentration categories under the low and high cost scenarios.

2. Impacts on Childhood IQ

The 2013 *Integrated Science Assessment for Lead* (USEPA, 2013) states that there is a causal relationship between lead exposure and cognitive function decrements in children based on several lines of evidence, including findings from prospective studies in diverse populations supported by evidence in animals, and evidence identifying potential modes of action. The evidence from multiple high-quality studies using large cohorts of children shows an association between blood lead levels and decreased intelligence quotient (IQ). The 2012 National Toxicology Program Monograph concluded that there is sufficient evidence of association between blood lead levels less than 5 µg/dL and decreases in various general and specific measures of cognitive function in children from three months to 16 years of age. This conclusion is based on prospective and cross-sectional studies using a wide range of tests to assess cognitive function (National Toxicology Program, 2012).

EPA quantitatively assessed and monetized the benefits of avoided losses in IQ as a result of the LCR revisions. Modeled lead tap water concentrations (previously discussed in this notice) are used to estimate the extent to which the LCRR would reduce avoidable loss of IQ

among children. The first step in the quantification and monetization of avoided IQ loss is to estimate the likely decrease in blood lead levels in children based on the reductions in lead in their drinking water as a result of the rulemaking.

EPA estimated the distribution of current blood lead levels in children, age 0 to 7, using EPA's Stochastic Human Exposure and Dose Simulation Multimedia (SHEDS-Multimedia) model coupled with its Integrated Exposure and Uptake Biokinetic (IEUBK) model. The coupled SHEDS–IEUBK model framework was peer reviewed by EPA in June of 2017 as part of exploratory work into developing a health-based benchmark for lead in drinking water (ERG, 2017). For further information on SHEDS–IEUBK model development and evaluation, refer to Zartarian et al. (2017). As a first step in estimating the blood lead levels, EPA utilized the SHEDS-Multimedia model, which can estimate distributions of lead exposure, using a two-stage Monte Carlo sampling process, given input lead concentrations in various media and human behavior data from EPA's Consolidated Human Activity Database (CHAD) and the Centers for Disease Control and Prevention's (CDC) National Health and Nutrition Examination Survey (NHANES). SHEDS-Multimedia, in this case, uses individual time-activity diaries from CDC's NHANES and EPA's CHAD for children aged 0 to 7 to simulate longitudinal activity diaries. Information from these diaries is then combined with relevant lead input distributions (*e.g.,* outdoor air lead concentrations) to estimate exposure. Drinking water tap concentrations for each of the modeled LSL and CCT scenarios, above, were used as the drinking water inputs to SHEDS-Multimedia. For more detail on the other lead exposure pathways that are held constant as background in the model, see Chapter 6, section 6.4, of the final rule EA.

In the SHEDS–IEUBK coupled methodology, the SHEDS model takes the place of the exposure and variability components of the IEUBK model by generating a probability distribution of lead intakes across media. These intakes are multiplied by route-specific (*e.g.,* inhalation, ingestion) absorption fractions to obtain a distribution of lead uptakes (see Exhibit 6–21 in the final rule EA Chapter 6, section 6.4). This step is consistent with the uptake estimation that would normally occur within the IEUBK model. The media specific uptakes can be summed across exposure routes to give total lead uptake per day. Next, EPA used age-based relationships derived from IEUBK, through the use of a polynomial regression analysis, to relate these total lead uptakes to blood lead levels. Exhibit 6–16 presents modeled SHEDS–IEUBK blood lead levels in children by year of life and LSL, CCT status, and POU. The blood lead levels in this exhibit represent what children's blood lead level would be if they lived under the corresponding LSL, POU, and CCT status combination for their entire lives. Note that when ''No LSL'' is the beginning or post-rule state, 0.82 μg/L is the assumed concentration across all levels of CCT status (none, partial, representative). The extent to which changes in CCT status make meaningful differences in lead concentrations for those without LSLs cannot be determined from this exhibit.

EXHIBIT 6–16—MODELED SHEDS-IEUBK GEOMETRIC MEAN BLOOD LEAD LEVELS IN CHILDREN FOR EACH POSSIBLE DRINKING WATER LEAD EXPOSURE SCENARIO FOR EACH YEAR OF LIFE

Lead service line status	Corrosion control treatment status	GM blood lead level (μg/dL) [b] for specified year of life							
		0–1 [a]	1–2	2–3	3–4	4–5	5–6	6–7	Avg.[c]
LSL	None	3.61	2.47	2.65	2.47	2.48	2.66	2.34	2.67
Partial	None	2.35	1.83	1.88	1.81	1.81	1.88	1.65	1.89
No LSL	None	0.97	1.14	1.18	1.15	1.14	1.19	0.98	1.11
LSL	Partial	2.57	1.93	2.05	1.95	1.94	2.03	1.76	2.03
Partial	Partial	1.72	1.52	1.57	1.54	1.51	1.58	1.37	1.54
No LSL	Partial	0.97	1.14	1.18	1.15	1.14	1.19	0.98	1.11
LSL	Representative	1.85	1.57	1.64	1.60	1.57	1.63	1.43	1.62
Partial	Representative	1.36	1.33	1.36	1.34	1.32	1.37	1.19	1.32
No LSL	Representative	0.97	1.14	1.18	1.15	1.14	1.19	0.98	1.11
POU		0.97	1.14	1.18	1.15	1.14	1.19	0.98	1.11

[a] Due to lack of available data, blood lead levels for the first year of life are based on regression from IEUBK for 0.5- to 1-year-olds only.
[b] These represent the blood lead for a child living with the LSL/CCT status in the columns to the left. Each year blood lead corresponding to actual modeled child is summed and divided by 7 in the model to estimate lifetime average blood lead.
[c] This column contains calculated average lifetime blood lead levels assuming a child lived in the corresponding LSL/CCT scenario for their entire life. Lifetime average blood lead levels above 5 μg/dL are in bold lettering.
This table presents modeled SHEDS–IEUBK blood lead levels in children by year of life.

The blood lead levels presented in Exhibit 6–16, are used as inputs for the benefits modeling. The EPA benefits analysis uses lifetime average blood lead values to determine estimates of avoided IQ loss that correspond to reductions in water lead concentrations resulting from changes in LSL, POU and CCT status at some point in a representative child's life (between ages 0 and 7), and those made prior to the child's birth for those born 7 years after the rule is implemented. Therefore, the EPA cost-benefit model, in each year of the analysis, calculates IQ benefits based on the cohort, or percent of the modeled population, that turns 7 years of age in the year being analyzed. The EPA model, for both the baseline and LCRR, tracks PWS implementation over the period of analysis. This data allows the model to determine the number of children that fall within each of the 10 possible LSL/CCT/POU lead exposure scenarios for each of the seven years prior to the year being modeled. The model then calculates a set of average lifetime blood lead levels for the possible LSL/CCT/POU exposure scenarios (the set of scenarios includes not only the change in LSL, CCT, and POU status but also the years, 0–7, in which the status changes occur) and applies these values to the appropriate percent of the 7 year old cohort (the percent of 7 year olds that are estimated to experience the scenarios represented by the average lifetime BLLs) for that analysis year under both the baseline and LCRR requirements. The change in average lifetime BLLs for the 7 year old cohort is then used to determine the incremental benefit of avoided IQ losses.

In order to relate the child's estimated average lifetime blood lead level to an estimate of avoided IQ loss, EPA selected a concentration-response function based on lifetime blood lead from the independent analysis by Crump et al. (2013). This study used data from a 2005 paper by Lanphear et al., which has formed the basis of concentration-response functions used

in several EPA regulations (National Ambient Air Quality Standard (USEPA, 2008a); the Toxic Substances Control Act (TSCA) Lead Repair and Renovation Rule (USEPA, 2008b); and Steam Electric Effluent Limitation Guidelines Rule (USEPA, 2015). The Crump et al. (2013) function was selected over Lanphear et al. (2005) to minimize issues with overestimating predicted IQ loss at the lowest levels of lead exposure (less than 1 μg/dL BLL), which is a result of the use of the log-linear function. The Crump et al. (2013) function avoids this issue by adding one to the estimated blood lead levels prior to log-transformation in the analysis. Since the revisions to the LCR are expected to reduce chronic exposures to lead, EPA selected lifetime blood lead as the most appropriate measure with which to evaluate benefits. No threshold has been identified for the neurological effects of lead (Budtz-Jørgensen et al., 2013; Crump et al., 2013; Schwartz et al., 1991; USEPA, 2013). Therefore, EPA assumes that there is no threshold for this endpoint and quantified avoided IQ loss associated with all blood lead levels. EPA, as part of its sensitivity analysis, estimated the BLL to IQ relationship using Lanphear et al. (2019) and Kirrane and Patel (2014).[1] See Chapter 6, section 6.4.3 and Appendix G of the final rule EA for a more detailed discussion (USEPA, 2020a).

The estimated value of an IQ point decrement is derived from EPA's reanalysis of Salkever (1995), which estimates that a one-point increase in IQ results in a 1.871 percent increase in lifetime earnings for males and a 3.409 percent change in lifetime earnings for females. Lifetime earnings are estimated using the average of 10 American Community Survey (ACS) single-year samples (2008 to 2017) and projected cohort life tables from the Social Security Administration. Projected increases in lifetime earnings are then adjusted for the direct costs of additional years of education and forgone earnings while in school. The reanalysis of Salkever (1995) estimates a change of 0.0812 years of schooling per change in IQ point resulting from a reduction in lead exposure for males and a change of 0.0917 years of schooling for females.

To estimate the uncertainty underlying the model parameters of the Salkever (1995) reanalysis, EPA used a bootstrap approach to estimate a distribution of model parameters over 10,000 replicates (using random sampling with replacement). For each replicate, the net monetized value of a one-point decrease in IQ is subsequently estimated as the gross value of an IQ point, less the value of additional education costs and lost earnings while in school. EPA uses an IQ point value discounted to age 7. Based on EPA's reanalysis of Salkever (1995), the mean value of an IQ point in 2016 dollars, discounted to age 7, is $5,708 using a 7 percent discount rate and $22,503 using a 3 percent discount rate.[2] See Appendix G, of the final rule EA (USEPA, 2020a) for a sensitivity analysis of avoided IQ loss benefits based on Lin et al. (2018).

EPA used the estimated changes in lifetime (age 0 to 7) average blood lead levels that result from changes in LSL, CCT, or POU status as inputs to the concentration response function from the independent analysis by Crump et al. (2013). The resultant annual avoided IQ decrements per change in LSL, CCT, and/or POU status change are then summed and multiplied by the EPA reanalyzed Salkever (1995) value per IQ point, which represent a weighted average for males and females (3 or 7 percent depending on the discount rate being used to annualize the stream of benefits across the period of analysis). This annual stream of benefits was annualized at 3 and 7 percent over the 35-year period of analysis, and further discounted to year one of the period of analysis. See Exhibit 6–19 (discounted at 3 percent) and Exhibit 6–20 (discounted at 7 percent) for the estimated benefit from avoided IQ losses from both LSL removals and improvements to CCT at public water system as a result of the previous rule, the LCR revisions, and the incremental difference between the previous and final rule estimates under both the low and high cost scenarios.

3. Impacts on Adult Blood Lead Levels

EPA identified the potential adverse adult health effects associated with lead utilizing information from the 2013 Integrated Science Assessment for Lead or EPA ISA (USEPA, 2013) and the HHS National Toxicology Program Monograph on Health Effects of Low-Level Lead (National Toxicology Program, 2012). The EPA ISA uses a five-level hierarchy to classify the weight of evidence for causation based on epidemiologic and toxicological studies, and the NTP Monograph conducted a review of the epidemiological literature for the association between low-level lead exposure (defined by blood lead levels <10 μg/dL) and select health endpoints, and categorized their conclusions using a four-level hierarchy. Constraining the assessment to the highest/most robust two levels from each of the documents finds that the EPA ISA reports ''causal'' and ''likely to be causal'', and the NTP Monograph indicates ''sufficient'' and ''limited'' evidence of association between lead and adult adverse cardiovascular effects (both morbidity and mortality effects), renal effects, reproductive effects, immunological effects, neurological effects, and cancer. (See Appendix D of the final rule EA).

Although EPA did not quantify or monetize the reduction in risk associated with adult health effects for the LCRR, the Agency has estimated the potential changes in adult drinking water exposures and thus blood lead levels to illustrate the extent of the lead reduction to the adult population estimated as a result of the LCRR. EPA estimated blood lead levels in adults for each year of life, beginning at age 20 and ending with age 80. Males and females are assessed separately because data from the CDC's National Health and Nutrition Examination Survey (NHANES) indicate that men have higher average blood lead levels than women, thus the baseline from which the changes are estimated. To estimate the changes in blood lead levels in adults associated with the rule, EPA selected from a number of available models a modified version of its Adult Lead Methodology (ALM). The ALM ''uses a simplified representation of lead biokinetics to predict quasi-steady state blood lead concentrations among adults who have relatively steady patterns of site exposures'' (USEPA, 2003). The model assumes a linear slope between lead uptake and blood lead levels, which is termed the ''biokinetic slope factor'' and is described in more detail in Chapter 6 section 6.5 of the final rule EA. Although the model was originally developed to estimate blood lead level impacts from lead in soil, based on the record, EPA finds the ALM can be tailored for use in estimating blood lead concentrations in any adult exposed population and is able to consider other

[1] Lanphear et al., (2005) published a correction in 2019 that revised the results to be consistent with the Kirrane and Patel (2014) corrections.

[2] It should be noted that these values are slightly different than those used in other recent rulemaking (*e.g.,* the Lead Dust Standard and the proposed Perchlorate rule). This is simply due to the differences in the age of the child when the benefits are accrued in the analysis. Benefits for the LCRR are accrued at age seven and therefore the value of an IQ point is discounted back to age 7 in the LCRR analysis. This results in a slightly higher estimate than the values used for the Perchlorate Rule and the Lead Dust Standard, which are discounted to age zero and age three, respectively. It should also be noted, and is described in Section 6.4.5, that the benefits in the LCRR are further discounted back to year one of the analysis and annualized within the EPA LCRR cost-benefit model.

sources of lead exposure, such as contaminated drinking water. The biokinetic slope factor of 0.4 µg/dL per µg/day is valid for use in the case of drinking water since it is in part derived from studies that measure both adult blood lead levels and concentrations of lead in drinking water (Pocock et al., 1983; Sherlock et al., 1982).

EPA estimated expected BLLs for adults with the ALM using the lead tap water concentration data by LSL, CCT, and POU status derived from the profile dataset, discussed in section VI.E.1 and shown in Exhibit 6–15 of this preamble. For the background blood lead levels in the model, EPA used geometric mean blood lead levels for males and females for each year of life between ages 20 and 80 from NHANES 2011–2016, which may result in some minor double counting of exposure from drinking water. Exhibit 6–17 displays the estimated blood lead levels for adults by each LSL, POU or CCT combination summarized by age groups (blood lead values for each year of age are used to determine average BLL). EPA also estimated BLLs using output for other exposure pathways from SHEDS in the ALM and the All Ages Lead Model, these results are shown in Appendix G of the final rule EA (USEPA, 2020a). The All Ages Lead Model results are not used in the primary analysis because updates to the model from a recent peer review have not been completed.

EXHIBIT 6–17—ESTIMATES OF BLOOD LEAD LEVELS IN ADULTS ASSOCIATED WITH DRINKING WATER LEAD EXPOSURES FROM LSL/CCT OR POU STATUS COMBINATIONS

Lead service line status	Corrosion control treatment status	Sex	Geometric mean blood lead level (µg/dL) for specified age group in years from the ALM					
			20–29	30–39	40–49	50–59	60–69	70–80
LSL	None	Males	1.87	2.02	2.22	2.42	2.63	2.89
		Females	1.57	1.69	1.89	2.22	2.35	2.52
Partial	None	Males	1.31	1.44	1.64	1.84	2.03	2.25
		Females	1.01	1.11	1.31	1.64	1.75	1.88
No LSL	None	Males	0.87	0.99	1.19	1.39	1.55	1.75
		Females	0.57	0.66	0.86	1.19	1.27	1.38
LSL	Partial	Males	1.40	1.53	1.73	1.93	2.12	2.35
		Females	1.10	1.20	1.40	1.73	1.84	1.98
Partial	Partial	Males	1.09	1.22	1.42	1.62	1.80	2.01
		Females	0.79	0.89	1.09	1.42	1.52	1.64
No LSL	Partial	Males	0.87	0.99	1.19	1.39	1.55	1.75
		Females	0.57	0.66	0.86	1.19	1.27	1.38
LSL	Representative	Males	1.14	1.27	1.47	1.67	1.84	2.06
		Females	0.84	0.94	1.14	1.47	1.56	1.69
Partial	Representative	Males	0.97	1.10	1.30	1.50	1.67	1.87
		Females	0.67	0.77	0.97	1.30	1.39	1.50
No LSL	Representative	Males	0.87	0.99	1.19	1.39	1.55	1.75
		Females	0.57	0.66	0.86	1.19	1.27	1.38
POU		Males	0.87	0.99	1.19	1.39	1.55	1.75
		Females	0.57	0.66	0.86	1.19	1.27	1.38

As discussed in the analysis of childhood IQ impacts section VI.E.2 of this preamble, the estimated BLLs in Exhibit 6–17 are average adult annual blood lead levels given the corresponding estimated lead tap water concentrations resulting from LSL, CCT, and POU status. The LCRR cost-benefit model, tracks the changes in LSL, CCT and POU status over time and the percentage of males and females in LSL households for each water system that are impacted by the changes in LSL, CCT, or POU status. These exposure histories and the corresponding BLL from the ALM model are then averaged across adult life spans to obtain a set of potential average lifetime blood lead levels for representative adults (average lifetime BLLs for potential exposure scenarios). Exhibit 6–18 shows the estimated changes in average lifetime blood lead levels for adults that move from the set of initial LSL, CCT, and POU status combinations to a new status as a result of LSL removal, and/or installation of CCT or POU. Note that when ''No LSL'' is the beginning or post-rule state, 0.82 µg/L is the assumed concentration across all levels of CCT status (none, partial, representative). The extent to which changes in CCT status make meaningful differences in lead concentrations for those without LSLs cannot be determined from this exhibit.

EXHIBIT 6–18—ESTIMATED LIFETIME AVERAGE BLOOD LEAD CHANGE FOR ADULTS MOVING BETWEEN LSL, CCT, AND POU STATUS COMBINATIONS

Pre-rule drinking water			Post-rule drinking water			Estimated change in the geometric means of blood lead change
Lead conc. (µg/L)	LSL status	CCT status	Lead conc. (µg/L)	LSL status	CCT status	Ages 20–80 (µg/dL)
18.08	LSL	None	0.82	No LSL	None	1.03
18.08	LSL	None	5.48	LSL	Representative	0.75
18.08	LSL	None	0.82	No LSL	Representative	1.03
18.08	LSL	None	0.82	POU		1.03
8.43	Partial	None	0.82	No LSL	None	0.46
8.43	Partial	None	2.64	Partial	Representative	0.35

EXHIBIT 6–18—ESTIMATED LIFETIME AVERAGE BLOOD LEAD CHANGE FOR ADULTS MOVING BETWEEN LSL, CCT, AND POU STATUS COMBINATIONS—Continued

Pre-rule drinking water			Post-rule drinking water			Estimated change in the geometric means of blood lead change
Lead conc. (μg/L)	LSL status	CCT status	Lead conc. (μg/L)	LSL status	CCT status	Ages 20–80 (μg/dL)
8.43	Partial	None	0.82	No LSL	Representative	0.46
8.43	Partial	None	0.82	POU		0.46
0.82	No LSL	None	0.82	No LSL	Representative	0.00
0.82	No LSL	None	0.82	POU		0.00
9.92	LSL	Partial	0.82	No LSL	Partial	0.54
9.92	LSL	Partial	5.48	LSL	Representative	0.27
9.92	LSL	Partial	0.82	No LSL	Representative	0.54
9.92	LSL	Partial	0.82	POU		0.54
4.72	Partial	Partial	0.82	No LSL	Partial	0.23
4.72	Partial	Partial	2.64	Partial	Representative	0.12
4.72	Partial	Partial	0.82	No LSL	Representative	0.23
4.72	Partial	Partial	0.82	POU		0.23
0.82	No LSL	Partial	0.82	No LSL	Representative	0.00
0.82	No LSL	Partial	0.82	POU		0.00
5.48	LSL	Representative	0.82	No LSL	Representative	0.28
5.48	LSL	Representative	0.82	POU		0.28
2.64	Partial	Representative	0.82	No LSL	Representative	0.11
2.64	Partial	Representative	0.82	POU		0.11
0.82	No LSL	Representative	0.82	POU		0.00

4. Total Monetized Benefits

Exhibits 6–19 and 6–20 show the estimated, monetized national annualized total benefits, under the low and high cost scenarios, from avoided child IQ decrements associated with the previous LCR, the LCRR, and the increment of change between the two, for CCT improvements, LSLR, and POU device implementation discounted at 3 and 7 percent, respectively. The potential changes in adult blood lead levels estimated from changing LSL and CCT status under the LCRR can be found in section VI.E.3 of this preamble and Chapter 6, section 6.5, of the final rule EA (USEPA, 2020a). The impact of lead on the risk of attention-deficit/hyperactivity disorder and reductions in birth weight are discussed in Appendix J of the final rule EA. It should also be noted that because of the lack of granularity in the assembled lead concentration profile data, with regard to CCT status when samples were collected (see section VI.E.1 of this preamble), the benefits of small improvements in CCT, like those resulting from the ''find-and-fix'' rule requirements, cannot be quantified in the model. For additional information on non-quantified benefits see section VI.F.2 of this preamble.

EXHIBIT 6–19—SUMMARY OF ESTIMATED NATIONAL ANNUAL MONETIZED BENEFITS—ALL PWS AT 3% DISCOUNT RATE

[2016$]

	Low cost estimate			High cost estimate		
	Previous LCR	Final LCRR	Incremental	Previous LCR	Final LCRR	Incremental
Number of Children Impacted (over 35 years)	29,000	928,000	900,000	704,000	3,210,000	2,506,000
Annual IQ Point Decrement Avoided (CCT Due to ALE)	190	3,225	3,035	5,228	17,583	12,355
Annual Value of IQ Impacts Avoided (CCT Due to ALE)	$3,344,000	$56,083,000	$52,739,000	$96,449,000	$318,322,000	$221,873,000
Annual IQ Point Decrement Avoided (CCT Due to TLE)	0	3,680	3,680	0	10,463	10,463
Annual Value of IQ Impacts Avoided (CCT Due to TLE)	$0	$64,736,000	$64,736,000	$0	$190,822,000	$190,822,000
Annual IQ Point Decrement Avoided (LSLR—Mandatory)	128	2,620	2,492	3,106	8,204	5,097
Annual Value of IQ Impacts Avoided (LSLR—Mandatory)	$2,375,000	$47,525,000	$45,150,000	$61,497,000	$156,772,000	$95,275,000
Annual IQ Point Decrement Avoided (LSLR—Goal Based)	0	1,807	1,807	0	3,337	3,337
Annual Value of IQ Impacts Avoided (LSLR—Goal Based)	$0	$32,855,000	$32,855,000	$0	$63,610,000	$63,610,000
Annual IQ Point Decrement Avoided (LSLR—Customer Initiated)	0	1,572	1,572	0	1,677	1,677
Annual Value of IQ Impacts Avoided (LSLR—Customer Initiated)	$0	$27,540,000	$27,540,000	$0	$29,198,000	$29,198,000
Annual IQ Point Decrement Avoided (POU)	0	17	17	0	2,214	2,214

EXHIBIT 6–19—SUMMARY OF ESTIMATED NATIONAL ANNUAL MONETIZED BENEFITS—ALL PWS AT 3% DISCOUNT RATE—Continued

[2016$]

	Low cost estimate			High cost estimate		
	Previous LCR	Final LCRR	Incremental	Previous LCR	Final LCRR	Incremental
Annual Value of IQ Impacts Avoided (POU)	$0	$324,000	$324,000	$0	$44,498,000	$44,498,000
Total Annual Value of IQ Benefits	$5,719,000	$229,062,000	$223,344,000	$157,946,000	$803,222,000	$645,276,000

EXHIBIT 6–20—SUMMARY OF ESTIMATED NATIONAL ANNUAL MONETIZED BENEFITS—ALL PWS AT 7% DISCOUNT RATE

[2016$]

	Low cost estimate			High cost estimate		
	Previous LCR	Final LCRR	Incremental	Previous LCR	Final LCRR	Incremental
Number of Children Impacted (over 35 years)	29,000	928,000	900,000	704,000	3,210,000	2,506,000
Annual IQ Point Decrement Avoided (CCT Due to ALE)	190	3,225	3,035	5,228	17,583	12,355
Annual Value of IQ Impacts Avoided (CCT Due to ALE)	$581,000	$9,551,000	$8,971,000	$17,790,000	$57,148,000	$39,358,000
Annual IQ Point Decrement Avoided (CCT Due to TLE)	0	3,680	3,680	0	10,463	10,463
Annual Value of IQ Impacts Avoided (CCT Due to TLE)	$0	$11,232,000	$11,232,000	$0	$34,750,000	$34,750,000
Annual IQ Point Decrement Avoided (LSLR—Mandatory)	128	2,620	2,492	3,106	8,204	5,097
Annual Value of IQ Impacts Avoided (LSLR—Mandatory)	$451,000	$8,703,000	$8,252,000	$12,707,000	$30,776,000	$18,069,000
Annual IQ Point Decrement Avoided (LSLR—Goal Based)	0	1,807	1,807	0	3,337	3,337
Annual Value of IQ Impacts Avoided (LSLR—Goal Based)	$0	$6,039,000	$6,039,000	$0	$12,469,000	$12,469,000
Annual IQ Point Decrement Avoided (LSLR—Customer Initiated)	0	1,572	1,572	0	1,677	1,677
Annual Value of IQ Impacts Avoided (LSLR—Customer Initiated)	$0	$4,797,000	$4,797,000	$0	$5,038,000	$5,038,000
Annual IQ Point Decrement Avoided (POU)	0	17	17	0	2,214	2,214
Annual Value of IQ Impacts Avoided (POU)	$0	$62,000	$62,000	$0	$9,417,000	$9,417,000
Total Annual Value of IQ Benefits	$1,032,000	$40,385,000	$39,353,000	$30,497,000	$149,599,000	$119,102,000

F. Cost-Benefit Comparison

This section summarizes and describes the numeric relationship between the monetized incremental costs and benefits of the final LCR revisions. The section also discusses both the non-monetized costs and benefits of the rulemaking. Exhibits 6–21 and 6–22 compare the annualized monetized incremental costs and benefits of the LCRR for the low and high cost scenarios. Under a 3 percent discount rate, the net annualized incremental monetized benefits, under the low and high cost scenarios, range from $49 to $296 million. Under the low and high cost scenarios and a 7 percent discount rate, the net annualized incremental monetized benefits range from a negative $148 to negative $273 million.

EXHIBIT 6–21—COMPARISON OF ESTIMATED MONETIZED NATIONAL ANNUALIZED INCREMENTAL COSTS TO BENEFITS OF THE LCRR AT 3% DISCOUNT RATE

[2016$]

PWS annual costs	Low cost scenario	High cost scenario
Annualized Incremental Costs	$160,571,000	$335,481,000
Annualized Incremental Benefits	223,344,000	645,276,000
Annual Net Benefits	62,773,000	309,795,000

EXHIBIT 6–22—COMPARISON OF ESTIMATED MONETIZED NATIONAL ANNUALIZED INCREMENTAL COSTS TO BENEFITS OF THE LCRR AT 7% DISCOUNT RATE

[2016$]

PWS annual costs	Low cost scenario	High cost scenario
Annualized Incremental Costs	$167,333,000	$372,460,000
Annualized Incremental Benefits	39,353,000	119,102,000
Annual Net Benefits	−127,980,000	−253,358,000

1. Non-Monetized Costs

The LCRR is expected to result in additional phosphate being added to drinking water to reduce the amount of lead leaching into water in the distribution system. EPA's cost model estimated that, nationwide, the LCRR will result in post WWTP total incremental phosphorus loads to receiving waterbodies increasing over the period of analysis, under the low cost and high cost scenarios, by a range of 161,000 to 548,000 pounds fifteen years after promulgation, and increasing under the low cost and high cost scenarios by a range of 355,000 to 722,000 pounds at year 35. At the national level, under the high cost scenario, this additional phosphorous loading to waterbodies is small, less than 0.1 percent of the total phosphorous load deposited annually from all other anthropogenic sources. However, national average receiving waterbody load impacts may obscure significant localized ecological impacts. Impacts, such as eutrophication, may occur in water bodies without restrictions on phosphate deposits, or in locations with existing elevated phosphate levels. See Chapter 5, section 5.5 of the final rule EA (USEPA, 2020a) for additional information.

2. Non-Quantified Non-Monetized Benefits

In addition to the benefits monetized in the final rule analysis for reductions in lead exposure, there are several other benefits that are not quantified. The risk of adverse health effects due to lead that are expected to decrease as a result of the LCRR are summarized in Appendix D of the final rule EA and are expected to affect both children and adults. EPA focused its non-quantified impacts assessment on the endpoints identified using two comprehensive U.S. Government documents summarizing the recent literature on lead exposure health impacts. These documents are EPA's Integrated Science Assessment for Lead (ISA) (USEPA, 2013); and the HHS National Toxicology Program Monograph on Health Effects of Low-Level Lead (National Toxicology Program (NTP), 2012). Both of these sources present comprehensive reviews of the literature on the risk of adverse health effects associated with lead exposure. EPA summarized those endpoints to which either EPA ISA or the NTP Lead Monograph assigned one of the top two tiers of confidence in the relationship between lead exposure and the risk of adverse health effects. These endpoints include cardiovascular effects, renal effects, reproductive and developmental effects, immunological effects, neurological effects, and cancer.

There are a number of final rule requirements that reduce lead exposure to both children and adults that EPA could not quantify. The final rule will require additional lead public education requirements that target consumers directly, schools and child care facilities, health agencies, and specifically people living in homes with LSLs. Increased education will lead to additional averting behavior on the part of the exposed public, resulting in reductions in the negative impacts of lead. The rule also will require the development of LSL inventories and making the location of LSLs publicly accessible. This will give exposed consumers more information and will provide potential home buyers this information as well, possibly resulting in additional LSL removals initiated by homeowners before, during, or following home sale transactions. The benefits of these additional removals are not quantified in the analysis of the LCRR. As indicated in section VI.E.4 of this preamble, because of the lack of granularity in the lead tap water concentration data available to EPA for the regulatory analysis, the benefits of small improvements in CCT to individuals residing in homes with LSLs, like those modeled under the ''find-and-fix,'' are not quantified.

EPA also did not quantify the benefits of reduced lead exposure to individuals who reside in homes that do not have LSLs. EPA has determined that the revised LCR requirements may result in reduced lead exposure to the occupants of these buildings as a result of improved monitoring and additional actions to optimize CCT. In the analysis of the LCRR, the number of non-LSL homes potentially affected by water systems increasing their corrosion control during the 35-year period of analysis is 8 million in the low cost scenario and 17 million in the high cost scenario. These households, while not having an LSL in place, may still contain leaded plumbing materials, including leaded brass fixtures, and lead solder. These households could potentially see reductions in tap water lead concentrations. EPA has assessed the potential benefits to children of reducing lead water concentrations in these homes (see Appendix F of the final rule EA) but has determined that the data are too limited and the uncertainties too significant to include in the quantified and monetized benefit estimates of this regulation.

Additionally, the risk of adverse health effects associated with copper that are expected to be reduced by the LCRR are summarized in Appendix E of the final rule EA. These risks include acute gastrointestinal symptoms, which are the most common adverse effect observed among adults and children. In sensitive groups, there may be reductions in chronic hepatic effects, particularly for those with rare conditions such as Wilson's disease and children pre-disposed to genetic cirrhosis syndromes. These diseases disrupt copper homeostasis, leading to excessive accumulation that can be worsened by excessive copper ingestion (National Research Council, 2000).

G. Other Regulatory Options Considered

The Office of Management and Budget recommends careful consideration ''of all appropriate alternatives for the key attributes or provisions of a rule (Office of Management and Budget, 2003). Pursuant to this guidance, EPA considered other regulatory options when developing the final LCRR related to:

- The lead in drinking water sampling program at schools and licensed child care facilities,
- the lead tap sampling protocol requirements for water systems with LSLs,
- LSL locational information to be made publicly available, and
- providing small system flexibility to CWSs that serve a population of 3,300 or fewer persons.

Exhibit 6–23 provides a summary of the final LCRR requirements and other option considered for these four areas.

EXHIBIT 6–23—SUMMARY OF OTHER OPTIONS CONSIDERED FOR THE FINAL LCRR

Area	Final LCRR	Other option considered
Lead in Drinking Water Sampling Program at Schools and Licensed Child Care Facilities.	*Mandatory program is, one five-year round of lead sampling:* • 20% of elementary schools and licensed child care facilities tested *annually.* • 5 samples per school. • 2 samples per licensed child care facility. On request program is implemented for secondary schools, and in elementary schools and child cares following the one cycle of mandatory sampling: • Maximum required sampling under on request program: *20 percent of* schools and licensed child cares *tested annually.* • 5 samples per elementary and secondary school. • 2 samples per licensed child care facility.	*Mandatory program:* • 20% of schools and licensed child care facilities tested *annually.* • 5 samples per school. 2 samples per licensed child care facility. On request program: • Schools and licensed child care facilities would be tested *on request.* • 5 samples per school. • 2 samples per licensed child care facility.
Lead Tap Sampling Requirements for Systems with Lead Service Lines (LSLs).	• Systems with LSLs collect 100% of their samples from LSLs sites, if available. • Samples are *fifth* liter, collected after 6-hour minimum stagnation time.	• Systems with LSLs collect 100% of their samples from LSLs sites, if available. • Samples are *first* liter, collected after 6-hour minimum stagnation time.
Publicly Available LSL Locational Information ...	Systems report a location identifier (*e.g.,* street, intersection, landmark) for LSLs.	Systems report the exact street address of LSLs.
Small System Flexibility	CWSs that serve 10,000 or fewer persons, and all NTNCWSs, are provided compliance flexibility when they exceed the AL.	CWSs that serve 3,300 or fewer persons, and all NTNCWSs, are provided compliance flexibility when they exceed the AL.

1. Lead Public Education and Sampling at Schools and Child Care Facilities

The final LCRR requires that all elementary schools and child care facilities must be sampled by CWSs once during an initial five year mandatory sampling period (schools and child care facilities may refuse the sampling, but the water system must document this refusal or non-response to the state). The CWS must also provide the facility with the 3Ts Toolkit. After this one cycle, or five years, of mandatory sampling, CWSs must provide sampling and public education though the 3Ts, on request, to all elementary school and child care facilities in their service area into the future. The final LCRR also requires CWSs to provide on request sampling to all secondary schools receiving water from their distribution system. EPA assumed that 5 percent of elementary and secondary schools, and child care facilities would request sampling per year under the on request sampling program. In developing the final rule requirements, EPA assessed two other alternatives. The first was requiring that all CWSs conduct a mandatory sampling and public education program for schools and licensed child care facilities that they serve. The attributes of the mandatory program are consistent with the final LCRR's requirements for the five-year round of monitoring at elementary schools and child care facilities, except this program continues with consecutive five-year monitoring rounds in perpetuity at all schools and child care facilities. The second alternative EPA considered was a purely on request program. This program would limit sampling to K–12 schools or child care facilities served by the water system that request sampling. The on request program is representative of the final rule sampling and public education requirements for secondary schools, and elementary schools and child care facilities after the cycle of mandatory testing. This alternative program, however, would begin on request sampling as part of the initial implementation of the school and child care testing program at all schools and child care facilities. In assessing the costs for the program, EPA maintained the assumption that five percent of schools and licensed child care facilities per year would elect to participate in the sampling program and that CWSs would contact each facility annually to determine its interest in the program in lieu of developing a sampling schedule for each facility. Exhibit 6–24 shows that the estimated costs of the final rule requirements are between those of the perpetual mandatory program and the on request program. Note that the costs of the final LCRR and on request option are highly dependent on the percentage of facilities that request to participate in the sampling program. There is a great degree of uncertainty regarding the percentage of facilities that will request this sampling and how this interest may fluctuate over time, indicating a higher degree of uncertainty in the estimated costs from the final LCRR and the on request program. The same is true for the unquantified benefits estimated to result from each alternative.

EXHIBIT 6–24—NATIONAL ANNUALIZED COSTS FOR SCHOOL SAMPLING ALTERNATIVES CONSIDERED IN THE RULEMAKING

[2016$]

Option	Annualized cost at 3% discount rate		Annualized cost at 7% discount rate	
	Low cost scenario	High cost scenario	Low cost scenario	High cost scenario
Final Rule:				
• Elementary Schools/Licensed Child Cares: Mandatory Program for one round of monitoring followed by On Request Program	$12,582,000	$12,960,000	$14,461,000	$14,969,000
• Secondary Schools: On Request Program.				
Proposed LCRR: Mandatory Program	27,751,000	28,268,000	27,221,000	27,875,000
Other Option Considered: On Request Program	9,501,000	9,729,000	9,279,000	9,567,000

2. Lead Tap Sampling Requirements for Water Systems With Lead Service Lines

The final LCRR requires that water systems with LSLs collect all compliance tap samples from sites served by LSLs as opposed to a minimum of 50 percent as required by the previous rule. As noted in section III.G of this preamble, tap sample sites served by an LSL are at the highest risk for elevated lead levels in drinking water, therefore, EPA revised the tap sample site selection criteria to ensure water systems with LSLs use those sites for lead tap sampling. The final rule requires that fifth liter sample be collected and analyzed at LSL tap sampling sites. EPA determined that a fifth liter tap sample better captures water that has been in contact with the LSL, and sample results would result in more protective measures. The sampling methodology associated with collecting a fifth liter sample (using five one-liter bottles returning the first, for copper analysis, and the fifth, for lead analysis) is more complicated and may introduce error, such as misidentifying the correct liter to be analyzed. Thus, EPA also considered requiring the collection of a first liter sample, essentially retaining the sampling procedure from the 1991 LCR because the first draw approach has been effectively implemented by water systems.

Exhibits 6–25 and 6–26 provide the national annualized rule costs and benefits, under the low cost scenario, discounted at 3 and 7 percent, for the previous rule, the final LCRR, and the first liter option. Exhibits 6–27 and 6–28 provide the high cost scenario national annualized rule costs and benefits at the 3 and 7 percent discount rates. At a 3 percent discount rate, EPA estimates lower total benefits, based on estimated avoided IQ point decrements, under the first liter option ($121 to $699 million) compared to the final LCRR ($229 to $803 million). The first liter option provides greater benefits than the previous rule ($6 to $158 million). EPA estimates that the total cost of the rule will be lower under the first liter option ($521 to $756 million) compared to the final LCRR ($554 to $808 million) but still greater than the previous rule ($394 to 473 million). The lower cost and benefit of the first liter option, compared to the fifth liter final rule requirement, is primarily the result of fewer water systems with LSLs exceeding the trigger and action levels and being required to conduct additional tap sampling and treatment requirements in the EPA cost-benefit model. In addition to lower quantified benefits, the first liter option is expected to result in lower unquantified benefits than the fifth liter option as the overall expected reductions in exposure to lead in drinking water would be less.

At a 7 percent discount rate, EPA estimates lower total benefits, based on estimated IQ point decrements, under the first liter option ($21 to $131 million) compared to the final LCRR ($40 to $150 million). Benefits of the first liter option are higher than the previous rule ($1 to $30 million). EPA estimates that the total cost of the rule will be lower under the first liter option ($502 to $780 million) compared to the final LCRR ($539 to $839 million) but greater than the previous rule ($371 to $467 million). Again, fewer water systems under the first liter option are required to conduct additional tap sampling and treatment requirements in response to trigger and action level exceedances producing lower costs and benefits as compared to the fifth liter requirement. And, the fifth liter option is expected to result in higher unquantified benefits resulting from greater reductions exposure to lead in drinking water.

EXHIBIT 6–25—ESTIMATED NATIONAL ANNUALIZED RULE COSTS AND BENEFITS FOR THE LOW COST SCENARIO AT 3% DISCOUNT RATE PREVIOUS RULE, FINAL LCRR, AND FIRST LITER OPTION

[2016$]

Benefit/cost category	Previous LCR total	Final LCRR		First liter option	
		Total	Incremental	Total	Incremental
Total Annual Rule Costs	$393,904,000	$554,475,000	$160,571,000	$520,724,000	$126,819,000
Total Annual PWS Costs	387,417,000	519,210,000	131,792,000	489,058,000	101,641,000
Total Annual Benefits	5,719,000	229,062,000	223,344,000	120,792,000	116,828,000

EXHIBIT 6–26—ESTIMATED NATIONAL ANNUALIZED RULE COSTS AND BENEFITS FOR THE LOW COST SCENARIO AT 7% DISCOUNT RATE PREVIOUS RULE, LCRR, AND FIRST LITER OPTION

[2016$]

Benefit/cost category	Previous LCR total	Final LCRR		First liter option	
		Total	Incremental	Total	Incremental
Total Annual Rule Costs	$371,188,000	$538,521,000	$167,333,000	$502,337,000	$131,149,000
Total Annual PWS Costs	364,711,000	501,316,000	136,605,000	469,123,000	104,412,000
Total Annual Benefits	1,032,000	40,385,000	39,353,000	21,059,000	20,353,000

EXHIBIT 6–27—ESTIMATED NATIONAL ANNUALIZED RULE COSTS AND BENEFITS FOR THE HIGH COST SCENARIO AT 3% DISCOUNT RATE PREVIOUS RULE, FINAL LCRR, AND FIRST LITER OPTION

[2016$]

Benefit/cost category	Previous LCR total	Final LCRR		First liter option	
		Total	Incremental	Total	Incremental
Total Annual Rule Costs	$472,821,000	$808,301,000	$335,481,000	$756,384,000	$283,609,000
Total Annual PWS Costs	459,523,000	758,343,000	298,820,000	699,766,000	241,286,000
Total Annual Benefits	157,946,000	803,222,000	645,276,000	699,463,000	566,338,000

EXHIBIT 6–28—ESTIMATED NATIONAL ANNUALIZED RULE COSTS AND BENEFITS FOR THE HIGH COST SCENARIO AT 7% DISCOUNT RATE PREVIOUS RULE, FINAL LCRR, AND FIRST LITER OPTION

[2016$]

Benefit/cost category	Previous LCR total	Final LCRR		First liter option	
		Total	Incremental	Total	Incremental
Total Annual Rule Costs	$466,523,000	$838,983,000	$372,460,000	$780,202,000	$313,725,000
Total Annual PWS Costs	450,316,000	781,224,000	330,908,000	713,442,000	261,177,000
Total Annual Benefits	30,497,000	149,599,000	119,102,000	131,155,000	105,772,000

3. Reporting of LSL-Related Information

EPA is requiring in the final LCRR that water systems make their inventory publicly available and systems with LSLs must include a locational identifier associated with each LSL. EPA is not requiring that address-level information be provided (see section III.C.3 of this preamble). Public disclosure of the LSL inventory would increase transparency and consumer awareness of the extent of LSLs in the distribution system. EPA, during the development of the final rule, considered an additional option in which systems with LSLs would be required to make the address associated with each LSL publicly available. Available information indicates that prospective buyers and renters value reductions in risks associated with LSLs. Public disclosure of LSL locations can create an incentive, through increased property values or home sale incentives, to replace LSLs.

EPA anticipates that the costs between the final rule requirement and this option would be similar because the system would use the same method for publicly providing and maintaining information regarding its LSL information and LSL locational information, *e.g.,* posting information to the water system's website. EPA anticipates the benefits between the address-level option and location identifier rule requirement would be similar. EPA expects that unquantified benefits of the address-level option may be higher due to the potential impacts on real estate transactions, although this is uncertain.

4. Small System Flexibility

As discussed in section III.E of this preamble, the final LCRR includes significant flexibility for CWSs that serve 10,000 or fewer persons, and all NTNCWSs. If these PWSs have an action level exceedance, they can choose from four options to reduce the concentration of lead in their water. The first three options which are modeled in the cost-benefit analysis are: (1) Replace seven percent of their baseline number of LSLs per year until all LSLs are replaced; (2) optimize existing CCT or install new CCT; (3) Provide POU devices to all customers. The LCRR provides a fourth option (not modeled), for CWSs and NTNCWSs that do not have LSLs and have control of all of the plumbing materials in their system. PWSs meeting these criteria may choose to replace all lead bearing plumbing on a schedule specified by the state and not to exceed one year. This additional option will give small entities more flexibility but because of the requirement that a system must have control of all plumbing materials it is unlikely large numbers of PWSs would select this compliance alternative. EPA, therefore, does not model this option in the cost analysis.

As part of the development of the final rule EPA also considered limiting small system flexibility to CWSs that serve 3,300 or fewer people and all NTNCWSs. Exhibits 6–29 and 6–30 provide the range of the estimated incremental annualized rule costs and benefits, under both the low and high cost scenarios, for the final LCRR and the alternative small system flexibility threshold option at a 3 percent and 7 percent discount rate, respectively.

EXHIBIT 6–29—ESTIMATED NATIONAL ANNUALIZED INCREMENTAL RULE COSTS AND BENEFITS AT 3% DISCOUNT RATE FOR THE FINAL LCRR AND THE ALTERNATIVE SMALL SYSTEM FLEXIBILITY THRESHOLD CONSIDERED IN THE RULEMAKING

[2016$]

Benefit/cost category	Final LCRR: Small system flexibility for CWSs serving <= 10,000 people and all NTNCWSs		Small system flexibility: CWSs serving <= 3,300 people and all NTNCWSs	
	Low cost scenario	High cost scenario	Low cost scenario	High cost scenario
Total Annual Rule Costs	$160,571,000	$335,481,000	$163,460,000	$363,607,000
Total Annual PWS Costs	131,792,000	298,820,000	134,013,000	322,711,000
Total Annual Benefits	223,344,000	645,276,000	226,970,000	675,533,000

EXHIBIT 6–30—NATIONAL ANNUALIZED INCREMENTAL RULE COSTS AND BENEFITS AT 7% DISCOUNT RATE FOR THE FINAL LCRR AND THE ALTERNATIVE SMALL SYSTEM FLEXIBILITY THRESHOLD CONSIDERED IN THE RULEMAKING

[2016$]

Benefit/cost category	Final LCRR: Small system flexibility for CWSs serving <= 10,000 people and all NTNCWSs		Small system flexibility: CWSs serving <= 3,300 people and all NTNCWSs	
	Low cost scenario	High cost scenario	Low cost scenario	High cost scenario
Total Annual Rule Costs	$167,333,000	$372,460,000	$170,418,000	$408,500,000
Total Annual PWS Costs	136,605,000	330,908,000	138,993,000	361,732,000
Total Annual Benefits	39,353,000	119,102,000	40,038,000	125,285,000

VII. Administrative Requirements

A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review

This action is an economically significant regulatory action that was submitted to the Office of Management and Budget (OMB) for review. Any changes made during interagency review in response to OMB recommendations have been documented in the docket. EPA prepared an analysis of the potential costs and benefits associated with this action. This analysis, the *Economic Analysis of the Final Lead and Copper Rule Revisions* (USEPA, 2020a), is available in the docket and is summarized in section VI of this preamble.

B. Executive Order 13771: Reducing Regulations and Controlling Regulatory Cost

This action is an Executive Order 13771 regulatory action. Details on the estimated costs of this final rule can be found in EPA's analysis of the potential costs and benefits associated with this action summarized in section VI.

C. Paperwork Reduction Act (From the Office of Mission Support's Information Collection Request Center) (PRA)

The information collection activities in this rule have been submitted for approval to the OMB under the PRA. The Information Collection Request (ICR) document that EPA prepared has been assigned the control number 2040–0297. You can find a copy of the ICR in the docket for this rule (EPA–HQ–OW–2017–0300), and it is briefly summarized here. The information collection requirements are not enforceable until OMB approves them.

The burden reflects the time needed to conduct state and public water system information collections and recordkeeping during the first three years after promulgation, as described in Chapter 8 from the Economic Analysis of the Final Lead and Copper Rule Revisions (USEPA, 2020a).

Burden means the total time, effort, or financial resources expended by people to generate, maintain, retain, disclose, or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology, and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

The PRA requires EPA to estimate the burden for public water systems and primacy agencies to comply with the final rule. EPA assumes there is one response per respondent per requirement. EPA anticipates public water systems will be involved in several implementation activities for the first three years after publication of the final LCRR. During the implementation period, one of the burdens that public water systems will incur is the burden to read and understand the LCRR. EPA estimates the average burden hours per response per respondent to read and understand the LCRR to be 4 hours. Another burden public water systems will incur is the burden of assigning personnel and devoting resources necessary to carry out the implementation of the final rule. EPA estimates the average burden hours per response per respondent to assign personnel and devote resources to be 8 hours. In addition, public water systems will need to participate in training sessions and receive technical assistance from their state during implementation of the LCRR. EPA estimates the average burden hours per response per respondent to conduct training and receive technical assistance to be 8 hours. Furthermore, public water systems will have to develop an LSL inventory or submit a demonstration to

the state that they do not have LSLs. EPA estimates the average burden hours per response per respondent to develop an LSL inventory to be 20 to 400 hours. EPA estimates the average burden hours per response per respondent to submit a demonstration of no LSLs to be 5 to 40 hours. Public water system systems will also have to confer with their primacy agency on initial planning for LSLR and prepare a LSLR plan. EPA estimates the average burden hours per response per respondent for initial planning and preparing a LSLR plan to be 12 to 52 hours.

Likewise, primacy agencies will face burdens due to the promulgation of the final rule. Primacy agencies will have to adopt the more stringent portions of the rule and develop programs to implement the LCRR. Primacy agencies are allowed to implement and develop more stringent requirements than the LCRR. EPA estimates the average burden hours per response per respondent to adopt the rule and develop a program for LCRR to be 1,920 hours. While primacy agencies are implementing the LCRR, there may be a need to modify their data system. EPA estimates the average burden hours per response per respondent to modify the data system to implement the LCRR to be 2,220 hours. Also, primacy agencies will need to provide training and technical assistance for their internal staff as well as for the staff of public water systems. EPA estimates the average burden hours per response per respondent to provide internal primacy agency staff with training for implementation of the LCRR to be 588 hours. EPA estimates the average burden hours per response per respondent to train and provide technical assistance to the staff of public water systems to be 2,400 hours. The primacy agencies are also responsible for assisting public water systems in developing an LSL inventory and reviewing submissions. EPA estimates the average burden hours per response per respondent to assist with developing a LSL inventory and review submissions to be 4 to 8 hours. In addition, primacy agencies will also have to review demonstrations of no LSLs from public water systems. EPA estimates the average burden hours per response per respondent to review demonstrations to be 2 hours. Primacy agencies will also have to confer on and review the initial LSLR plan from public water systems. EPA estimates the average burden hours per response per respondent to review demonstrations to be 6 to 26 hours.

The information collected under the ICR is critical to states and other authorized entities that have been granted primacy (*i.e.,* primary enforcement authority) for the Lead and Copper Rule (LCR). These authorized entities are responsible for overseeing the LCR implementation by certain public water systems within their jurisdiction. Primacy agencies would utilize these data to determine compliance, designate additional treatment controls to be installed, and establish enforceable operating parameters. The collected information is also necessary for public water systems. Public water systems would use these data to demonstrate compliance, assess treatment options, operate and maintain installed treatment equipment, and communicate water quality information to consumers served by the water system. Primacy agencies would also be required to report a subset of these data to EPA. EPA would utilize the information to protect public health by ensuring compliance with the LCR, measuring progress toward meeting the LCR's goals, and evaluating the appropriateness of state implementation activities. No confidential information would be collected as a result of this ICR.

Respondents/affected entities: Data associated with this final ICR would be collected and maintained at the public water system, and by Federal and state governments. Respondents would include owners and operators of public water systems, who must report to their primacy agency(s).

Respondent's obligation to respond: Under this rule the respondent's obligation to respond is mandatory. Section 1401(1)(D) of the Safe Drinking Water Act (SDWA) requires that ''criteria and procedures to assure a supply of drinking water which dependably complies with such maximum contaminant levels [or treatment techniques promulgated in lieu of a maximum contaminant level]; including accepted methods for quality control and testing procedures to insure compliance with such levels and to insure proper operation and maintenance of the system . . .'' Furthermore, section 1445(a)(1)(A) of the SDWA requires that ''[e]very person who is subject to any requirement of this subchapter or who is a grantee, shall establish and maintain such records, make such reports, conduct such monitoring, and provide such information as the Administrator may reasonably require by regulation to assist the Administrator in establishing regulations under this subchapter, in determining whether such person has acted or is acting in compliance with this subchapter . . .'' In addition, section 1413(a)(3) of the SDWA requires states to ''keep such records and make such reports . . . as the Administrator may require by regulation.''

Estimated number of respondents: The total number of respondents for the ICR would be 67,712. The total reflects 56 primacy agencies and 67,656 public water systems.

Frequency of Response: During the initial three year period, public water systems will conduct one-time startup activities. The one-time burden associated with reading and understanding the rule, assigning personnel and resources, and attending training is estimated to be an average of 20 hours per system. These activities will be undertaken by all 67,656 CWSs and NTNCWSs that must comply with the LCRR. The total burden for these activities, for the three year period, for all systems is estimated to be 1,353,120 hours. During the initial three year period, primacy agencies will incur burdens associated with one-time startup activities. The burden associated with adopting the rule, modifying data systems, and providing training for internal staff and the staff of public water systems during the first three years is estimated at an average of 7,128 hours per primacy agency. The total burden for these activities, for the three year period, for the 56 primacy agencies is estimated to be 399,168 hours.

Average estimated burden: The average burden per response (*i.e.,* the amount of time needed for each activity that requires a collection of information) is estimated to be 9.16 to 9.63 hours; the average cost per response is $333–351.

Total estimated burden: For the first three years after the final rule is published, water systems and primacy agencies will implement several requirements. Since the first three years of the rule focuses on the creation of inventories for LSLs, households are not faced with costs. The public water systems burden will include the following activities: Reading and understanding the revised rule, personnel time for attending trainings, clarifying regulatory requirements with the primacy agency during rule implementation. Public water systems will also be required to create an LSL materials inventory and develop an initial LSLR plan. The total burden hours for public water systems ranges from 2.51 to 2.69 million hours. The total cost for public water systems ranges from $77.5 to $83.4 million. For additional information on the public water systems activity burden see sections VI.D of this preamble.

The state burden for the first three years of rule implementation would include the following: Adopting the rule

and developing an implementation program; modifying data recording systems; training staff; providing water system staff with initial and on-going technical assistance and training; coordinating annual administration tasks with EPA; reporting data to SDWIS/Fed; reviewing public water system (PWS) inventory data; and conferring with LSL water systems on initial planning for LSLR program activities. The total burden hours for primacy agencies is 657,034 to 698,096 hours. The total cost for primacy agencies is $37.6 to $40.0 million. See section VI.D.8 of this preamble for additional discussion on burden and cost to the primacy agency.

The net change burden associated with moving from the information requirements of the previous rule to those in the final LCRR over the three years covered by the ICR is 3.17 to 3.4 million hours, for an average of 1.06 to 1.13 million hours per year. The range reflects the upper- and lower-bound estimates of the number of systems that need to develop LSL inventories. The total net change in costs over the three-year clearance period are $115.2 to $123.3 million, for an average of $38.4 to $41.1 million per year (simple average over three years).

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations in 40 CFR are listed in 40 CFR part 9. When OMB approves this ICR, the Agency will announce that approval in the **Federal Register** and publish a technical amendment to 40 CFR part 9 to display the OMB control number for the approved information collection activities contained in this final rule.

D. Regulatory Flexibility Act as Amended by the Small Business Regulatory Fairness Act (RFA)

Pursuant to sections 603 and 609(b) of the RFA, EPA prepared an initial regulatory flexibility analysis (IRFA) for the proposed rule and convened a Small Business Advocacy Review (SBAR) Panel to obtain advice and recommendations from small entity representatives that potentially would be subject to the rule's requirements. Summaries of the IFRA and Panel recommendations are presented in the proposed rule at 84 FR 61684, November 13, 2019. As required by section 604 of the RFA, EPA prepared a final regulatory flexibility analysis (FRFA) for this action. The FRFA addresses the issues raised by public comments on the IRFA for the proposed rule. The complete FRFA is available for review in Chapter 8, section 8.4 of the final rule EA and is summarized here.

For purposes of assessing the impacts of this final rule on small entities, EPA considered small entities to be water systems serving 10,000 people or fewer. This is the threshold specified by Congress in the 1996 Amendments to the SDWA for small water system flexibility provisions. As required by the RFA, EPA proposed using this alternative definition in the **Federal Register** (FR) (US EPA, 1998b, 63 FR 7620, February 13, 1998), sought public comment, consulted with the Small Business Administration, and finalized the small water system threshold in the Agency's Consumer Confidence Report regulation (USEPA, 1998a, 63 FR 44524, August 19, 1998). As stated in that document, the alternative definition would apply to this regulation.

Under the SDWA, EPA sets public health goals and enforceable standards for drinking water quality. As previously described, the LCR requires water systems to take actions to address lead and copper contamination in drinking water, including corrosion control treatment, public education, and LSLR. EPA regulatory revisions in the final rule strengthen public health protection and improve implementation in the following areas: Tap sampling, corrosion control treatment, LSLR, public notification and public education.

EPA took a number of steps to solicit small entity stakeholder input during the development of the final LCRR. Chapter 2, Section 2.2 of the final rule EA contains detailed information on stakeholder outreach during the rulemaking process, including material on the Federalism and Tribal consultation processes (also outlined in Sections VII.F and VII.G of this preamble). EPA also specifically sought input from small entity stakeholders through the Small Business Advocacy Review Panel (SBAR) process under Section 609(b) of the RFA, as amended by the SBREFA. On August 14, 2012, the EPA's Small Business Advocacy Chairperson convened an SBAR Panel. In addition to its chairperson, the SBAR Panel consisted of the Director of the Standards and Risk Management Division within the EPA's Office of Ground Water and Drinking Water, the Administrator of the Office of Information and Regulatory Affairs within the OMB, and the Chief Counsel for Advocacy of the SBA. Detailed information on the overall panel process can be found in the panel report titled, *The Small Business Advocacy Review Panel on EPA's Planned Proposed Rule to Public Water System Requirements* available in the LCRR docket (EPA–HQ–OW–2017–0300). The Agency also received comment on the proposed rule revisions that provided small CWSs, serving 10,000 or fewer persons, and all NTNCWSs greater flexibility to comply with the requirements of the LCRR. The detailed public comment summaries including EPA's detailed responses are provided in Section III.E.2 of this preamble.

EPA identified over 63,324 small public water systems that may be impacted by the final LCR revisions. A small public water system serves between 25 and 10,000 people. These water systems include over 45,758 CWSs that serve year-round residents and more than 17,566 NTNCWSs that serve the same persons over six months per year (*e.g.,* a public water system that is an office park or church). The final rule revisions to the LCR include requirements for: Conducting an LSL inventory that is updated annually; installing or re-optimizing corrosion control treatment when water quality declines; enhanced water quality parameter monitoring; establishment of a ''find-and-fix'' provision to evaluate and remediate elevated lead at a site where the tap sample exceeds the lead action level; and improved customer outreach. These final rule revisions also include reporting and recordkeeping requirements. States are required to implement operator certification (and recertification) programs under SDWA section 1419 to ensure operators of CWSs and NTNCWSs, including small water system operators, have the appropriate level of certification.

As a mechanism to reduce the burden of the final rule requirements on small entities EPA has promulgated compliance flexibilities for small CWSs serving 10,000 or fewer persons, and all NTNCWS with a 90th percentile lead value above the lead trigger level or action level. These systems may choose between LSLR; CCT installation; POU device installation and maintenance; and replacement of lead-bearing materials as the compliance option. As part of the FRFA analysis, EPA is estimating low and high cost scenarios to characterize uncertainty in the cost model results. These scenarios are functions of assigning different, low and high, input values to a number of variables that affect the relative cost of the small system compliance options. As indicated in Exhibit 7–1, under the previous LCR, EPA estimates that, under the low cost scenario, 26,013 small CWSs will have annual total LCR related costs of more than one percent of revenues, and that 13,339 of these

small CWSs will have annual total costs of three percent or greater of revenue. Under the final LCRR, the number of small CWSs that will experience annual total costs of more than one percent of revenues increases by 11,873 to 37,885 and the number of small CWSs that will have annual total costs exceeding three percent of revenues increases by 8,521 to 21,860. Under the high cost scenario, EPA estimates that under the previous LCR, 27,719 small CWSs will have annual total costs of more than one percent of revenues, and that 15,472 of these small CWSs will have annual total costs of three percent or greater of revenue. Under the final LCRR, the number of small CWSs that will experience annual total costs of more than one percent of revenues increases by 13,221 to 40,940 and the number of small CWSs that will have annual total costs of more than three percent of revenues increases by 9,994 to 25,466.

EXHIBIT 7–1—NUMBER OF SMALL COMMUNITY WATER SYSTEMS WITH ANNUAL LCR-RELATED COSTS OF ABOVE 1 PERCENT OR 3 PERCENT OF ANNUAL REVENUE FOR THE PREVIOUS RULE AND FINAL LCRR UNDER THE LOW COST AND HIGH COST SCENARIOS

Number of small CWSs with:	Previous rule	Final LCRR
Low Cost Scenario		
Annual LCR-related costs >1 percent of revenue	26,013	37,885
Annual LCR-related costs >3 percent of revenue	13,339	21,860
High Cost Scenario		
Annual LCR-related costs >1 percent of revenue	27,719	40,940
Annual LCR-related costs >3 percent of revenue	15,472	25,466

EPA also assessed the degree to which the final LCRR small system flexibilities would mitigate compliance costs. The Agency estimated the cost of the LCRR if no compliance alternatives were available to small systems. The annual incremental cost of the LCRR without the small system compliance alternatives ranges from $174 to $419 million at a 3 percent discount rate, and from $180 to $474 million at a 7 percent discount rate in 2016 dollars. This demonstrates a cost savings, from allowing CWSs that serve 10,000 or fewer persons, and all NTNCWSs compliance flexibilities, of between $13 million and $101 million across discount rates and low/high cost scenarios.

See Chapter 8, section 8.4 of the final LCRR Economic Analysis (USEPA, 2020a) for more information on the characterization of the impacts under the final rule. EPA has considered an alternative approach to provide regulatory flexibility to small water systems. Section 8.4 of the final LCRR Economic Analysis contains an assessment of impacts for an alternative option that sets the threshold for system compliance flexibility at systems serving 3,300 or fewer persons. See section III.E of this preamble for the detailed explanation of the rationale for EPA's selection of systems serving 10,000 or fewer persons for the CWS small systems flexibilities threshold.

In addition, EPA is preparing a Small Entity Compliance Guide to help small entities comply with this rule. The Small System Compliance Guide would be developed the first 3 years after promulgation.

E. The Unfunded Mandates Reform Act (UMRA)

This action contains a Federal mandate under UMRA, 2 U.S.C. 1531–1538, that may result in expenditures of $100 million or more for state, local and tribal governments, in the aggregate, or the private sector in any one year. Accordingly, EPA has prepared a written statement required under section 202 of UMRA. The statement is included in the docket for this action (see Chapter 8 in the Economic Analysis of the Final Lead and Copper Rule Revisions (USEPA, 2020a)) and is briefly summarized here.

Consistent with the intergovernmental consultation provisions of UMRA section 204, EPA consulted with governmental entities affected by this rule. EPA describes the government-to-government dialogue and comments from state, local, and tribal governments in section VII.F Executive Order 13132: Federalism and section VII.G Executive Order 13175: Consultation and Coordination with Indian Tribal Governments of this preamble.

Consistent with UMRA section 205, EPA identified and analyzed a reasonable number of regulatory alternatives to determine the treatment technique requirements in the final LCR revisions. Sections III, IV, and V of this preamble describe the final options. See section VI.F of this preamble and Chapter 9 in the Economic Analysis of the Final Lead and Copper Rule Revisions (USEPA, 2020a) for alternative options that were considered.

This action may significantly or uniquely affect small governments. EPA consulted with small governments concerning the regulatory requirements that might significantly or uniquely affect them. EPA describes this consultation above in the Regulatory Flexibility Act (RFA), section VIII.D of this preamble.

F. Executive Order 13132: Federalism

EPA has concluded that this action has Federalism implications, as specified in Executive Order 13132 (64 FR 43255, August 10, 1999), because it imposes substantial direct compliance costs on state or local governments. EPA provides the following federalism summary impact statement. EPA consulted with state and local officials early in the process of developing the proposed action to permit them to have meaningful and timely input into its development. EPA held federalism consultations on November 15, 2011, and on January 8, 2018. EPA invited the following national organizations representing state and local elected officials to a meeting on January 8, 2018, in Washington DC: The National Governors' Association, the National Conference of State Legislatures, the Council of State Governments, the National League of Cities, the U.S. Conference of Mayors, the National Association of Counties, the International City/County Management Association, the National Association of Towns and Townships, the County Executives of America, and the Environmental Council of the States. Additionally, EPA invited the Association of State Drinking Water Administrators, the Association of Metropolitan Water Agencies, the

National Rural Water Association, the American Water Works Association, the American Public Works Association, the National School Board Association, the American Association of School Administrators, and the Western Governors' Association to participate in the meeting. EPA also provided the associations' membership an opportunity to provide input during follow-up meetings. EPA held five follow up meetings between January 8, 2018, and March 8, 2018. In addition to input received during the meetings, EPA provided an opportunity to receive written input within 60 days after the initial meeting. A summary report of the views expressed during Federalism consultations is available in the Docket (EPA–HQ–OW–2017–0300).

G. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

This action has tribal implications, since it may impose substantial direct compliance costs on tribal governments, and the Federal Government will not provide the funds necessary to pay those costs. There are 996 public water systems serving tribal communities, 87 of which are federally owned. The economic analysis of the final LCRR requirements estimated that the total annualized incremental costs placed on all systems serving tribal communities ranges from $1–$2.4 million. While the average annual incremental cost increase per tribal system is estimated to range from $1,027 to $2,362, EPA notes that these estimated impacts will not fall evenly across all tribal systems. The final LCRR does offer regulatory relief by providing flexibility for CWSs serving 10,000 or fewer people and all NTNCWSs to choose CCT, LSLR, POU devices, and replacement of lead-bearing materials to address lead in drinking water. This flexibility may result in LCR implementation cost savings for many tribal systems since 98 percent of tribal CWSs serve 10,000 or fewer people and 17 percent of all tribal systems are NTNCWSs. EPA consulted with tribal officials under EPA's Policy on Consultation and Coordination with Indian Tribes early in the process of developing this regulation to permit them to have meaningful and timely input into its development. A summary of that consultation is provided in the Docket (EPA–HQ–OW–2017–0300). EPA held consultations with federally-recognized Indian Tribes in 2011 and 2018. The 2018 consultations with federally-recognized Indian Tribes began on January 16, 2018 and ended March 16, 2018. The first national webinar was held January 31, 2018, while the second national webinar was held February 15, 2018. A total of 48 tribal representatives participated in the two webinars. Updates on the consultation process were provided to the National Tribal Water Council upon request at regularly scheduled monthly meetings during the consultation process. Also, upon request, informational webinars were provided to the National Tribal Toxics Council's Lead Subcommittee on January 30, 2018, and EPA Region 9's Regional Tribal Operations Committee (RTOC) on February 8, 2018. Additionally, EPA received written comments from the following Tribes and tribal organizations: The Navajo Tribal Utility Authority, the National Tribal Water Council, the United South and Eastern Tribes Sovereignty Protection Fund, and the Yukon River Inter-Tribal Watershed Council.

EPA has reviewed the estimated cost data, the comments received from tribal groups, and the quantified and non-quantified benefits associated with the revision to the LCR and determined that the regulatory burden placed on tribes is outweighed by the positive benefits. Given that the majority of tribal systems serve fewer than 10,000 persons, EPA has provided regulatory relief in the form of small system compliance flexibilities. For additional information on these compliance flexibilities and their estimated impacts see sections III.E and VII.D of this preamble and Chapter 8, section 8.4 of the final LCRR Economic Analysis (USEPA, 2020a).

As required by section 7(a) of the Executive order, EPA's Tribal Official has certified that the requirements of the executive order have been met in a meaningful and timely manner. A copy of the certification is included in the docket for this action.

H. Executive Order 13045: Protection of Children From Environmental Health and Safety Risks

This action is subject to Executive Order 13045 because it is an economically significant regulatory action as defined by Executive Order 12866, and, based on the record, EPA finds that the environmental health or safety risk addressed by this action has a disproportionate effect on children. Accordingly, EPA has evaluated the environmental health and safety effects of lead found in drinking water on children and estimated the exposure reduction, risk reduction and health endpoint impacts to children associated with the adoption and optimization of corrosion control treatment technologies and the replacement of LSLs. There are non-quantified lead health benefits to children that will be realized as a result of this rulemaking, including from testing in schools and child care facilities. EPA assessed benefits of the LCRR in terms of avoided losses in the intelligence quotient (IQ) in children that result from the additional actions required under the LCRR. The results of these evaluations are contained in the *Economic Analysis of the Final Lead and Copper Rule Revisions* (USEPA, 2020a) and described in section VI.D.2 of this preamble. Copies of the *Economic Analysis of the Final Lead and Copper Rule Revisions* and supporting information are available in the Docket (EPA–HQ–OW–2017–0300).

I. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use

This action is not a ''significant energy action'' because it is not likely to have a significant adverse effect on the supply, distribution or use of energy. The public and private water systems affected by this action do not, as a rule, generate power. This action does not regulate any aspect of energy distribution as the water systems that are regulated by the LCR already have electrical service. Finally, EPA has determined that the incremental energy used to implement corrosion control treatment at drinking water systems in response to the final regulatory requirements is minimal. As such, EPA does not anticipate that this rule will have a significant adverse effect on the supply, distribution, or use of energy.

J. National Technology Transfer and Advancement Act of 1995

This action involves technical standards. EPA may use existing voluntary consensus standards as it relates to additional monitoring for lead and copper, since monitoring and sample analysis methodologies are often based on voluntary consensus standards. However, the final LCRR does not change any methodological requirements for monitoring or sample analysis. EPA's approved monitoring and sampling protocols generally include voluntary consensus standards that are in accordance with applicable standards established by an organization accredited for that purpose such as the American National Standards Institute (ANSI), and other such accrediting bodies deemed appropriate for compliance monitoring by the Administrator. EPA notes that in some cases, this rule revises the required frequency and number of lead tap samples.

K. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

EPA believes that this action does not have disproportionately high and adverse human health or environmental effects on minority populations, low-income populations and/or indigenous peoples, as specified in Executive Order 12898 (59 FR 7629, February 16, 1994). The documentation for this decision is contained in the Environmental Justice Analysis for the Final Lead and Copper Revision Rule Report, which can be found in the docket ID EPA–HQ–OW–2017–0300. Executive Order 12898 (59 FR 7629, February 16, 1994) establishes Federal executive policy on environmental justice. Its main provision directs Federal agencies, to the greatest extent practicable and permitted by law, to make environmental justice part of their mission. Agencies must do this by identifying and addressing as appropriate any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States.

In evaluating baseline exposure to lead in drinking water, data indicate that the possibility of a disproportionately high and adverse human health risk among minority populations and low-income populations exist. Higher than expected proportions of children in minority households and/or low-income households live in housing built during decades of higher LSL usage. The final rule seeks to reduce the health risks of exposure to lead in drinking water provided by CWSs and NTNCWSs. Since water systems with LSLs are more likely to have an action level exceedance or a trigger level exceedance and, therefore, engage in actions to reduce lead concentrations, the final rule should help improve the baseline environmental justice concerns. The final rule is not expected to have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. The final rule should result in CCT and LSLR changes at water systems with higher baseline lead concentrations. It increases the level of health protection for all affected populations. The LSLR provision may be less likely than the CCT provision to address baseline health risk disparity among low-income populations because LSLR may not be affordable for low-income households.

However, there are Federal and state programs that may be used to fund LSLR programs including the cost of LSLR for customer-owned LSLs. These include but are not limited to the Drinking Water State Revolving Fund (DWSRF), Water Infrastructure Finance and Innovation Act (WIFIA) Program, Water Infrastructure Improvements for the Nation (WIIN) Act of 2016 grant programs, and U.S. Department of Housing and Urban Development's (HUD) Community Development Block Grant (CDBG) Program. The benefit-cost analysis of the final rule indicates that CCT changes will account for most of the benefits. Therefore, health risk reduction benefits will be more uniformly distributed among populations with high baseline health risks including minority and low-income households. Also, given the availability of Federal and state funding sources to support full LSLR, the final rule meets the intent of the Federal policy requiring incorporation of environmental justice into Federal agency missions.

L. Consultations With the Science Advisory Board and the National Drinking Water Advisory Council

1. Consultation With the Science Advisory Board (SAB) Under SDWA Section 1412(e)

As required by section 1412(e) of the SDWA, in 2011, EPA sought an evaluation of current scientific data to determine whether partial LSLR effectively reduce water lead levels. When the LCR was promulgated in 1991, large water systems, serving greater than 50,000 people, were required to install CCT and small and medium water systems, serving 50,000 or fewer people if samples exceeded the action level for lead. If the action level was not met after installing CCT, water systems are required to replace 7 percent of its LSLs annually. However, in 2000, revisions to the LCR allowed water systems, if they exceeded the action level, to replace only the portion of the LSL that the water system owned and to replace the customer's portion of the LSL at the customer's expense. This practice is known as a partial LSLR.

EPA asked the SAB to evaluate the current scientific data on the following five partial LSLR issues: (1) Associations between partial LSLR and blood lead levels in children; (2) lead tap water sampling data before and after partial LSLR; (3) comparisons between partial and full LSLR; (4) partial LSLR techniques; and (5) the impact of galvanic corrosion. EPA identified several studies for the SAB to review while the SAB selected additional studies for their evaluation. The SAB deliberated and sought input from public meetings held on March 30 and 31, 2011, and during a public conference call on May 16, 2011. The SAB's final report, titled ''SAB Evaluation of the Effectiveness of Partial Lead Service Line Replacements'' was approved by the SAB on July 19, 2011, and transmitted to the EPA Administrator on September 28, 2011.

The SAB determined that the quality and quantity of data was inadequate to fully evaluate the effectiveness of partial LSLR in reducing drinking water lead concentrations. Both the small number of studies and the limitations within these studies (*i.e.,* lack of comparability between studies, small sample size) barred a comprehensive assessment of partial LSLR efficacy. However, despite the limitations, the SAB concluded that partial LSLR's have not been shown to reliably reduce drinking water lead levels in the short-term of days to months, and potentially even longer. Additionally, partial LSLR is often associated with elevated drinking water lead levels in the short-term. The available data suggested that the elevated drinking water lead levels after the partial LSLR tend to stabilize over time to lower than or to levels similar to before the partial LSLR. Therefore, the SAB concluded that available data suggest that partial LSLR's may pose a risk to the population due to short-term elevations in drinking water lead concentrations after a partial LSLR, which last for an unknown period. Considering the SAB's findings on partial LSLR, EPA determined that partial replacements should no longer be required when water systems exceed the action level for lead, but EPA still considers full replacement of the LSL as beneficial (USEPA, 2011b).

Following the proposal, the SAB elected to review the scientific and technical basis of the proposed rule, on March 30, 2020. A work group took the lead in SAB deliberations on this topic at a public teleconference held on May 11, 2020. The SAB provided advice and comments in its June 12, 2020 report. Similar comments that were raised by the SAB were also raised by public commenters. As a result, the comments have been addressed by EPA in the final rule, supporting documents and throughout this notice.

2. Consultation With National Drinking Water Advisory Council Under SDWA Section 1412(d)

The National Drinking Water Advisory Council (NDWAC) is a Federal Advisory Committee that supports EPA

in performing its duties and responsibilities related to the national drinking water program and was created as a part of SDWA in 1974. EPA sought advice from the NDWAC as required under Section 1446 of the SDWA. EPA consulted with NDWAC on July 21–22, 2011, to provide updates on the proposed LCR revisions and solicit feedback on potential regulatory options under consideration. In November 2011, NDWAC held deliberations on LSLR requirements after they received the SAB's final report on the effectiveness of partial LSLR. In December 2011, a public meeting was held where NDWAC provided EPA with major recommendations on the potential LCR regulatory revisions, which are outlined in a letter dated December 23, 2011.

In 2014, the NDWAC formed the Lead and Copper Rule Working Group (LCRWG) to provide additional advice to EPA on potential options for long-term regulatory revisions. EPA held meetings from March of 2014 until June 2015 where NDWAC LCRWG members discussed components of the rule and provided EPA with advice for addressing the following issues: Sample site collection criteria, lead sampling protocols, public education for copper, and measures to ensure optimal CCT and LSLR. NDWAC provided the Agency with their final recommendations and findings in a report submitted to the Administrator in December 2015. In the report, NDWAC acknowledged that reducing lead exposure is a shared responsibility between consumers, the government, public water systems, building owners, and public health officials. In addition, they recognized that creative financing is necessary to reach the LSL removal goals, especially for disparate and vulnerable communities. The NDWAC advised EPA to maintain the LCR as a treatment technique rule but with enhanced improvements. NDWAC qualitatively considered costs before finalizing its recommendations, emphasizing that public water systems and states should focus efforts where the greatest public health protection can be achieved, incorporating their anticipated costs in their capital improvement program or the requests for Drinking Water State Revolving Funds. The LCRWG outlined an extensive list of recommendations for the LCR revisions, including establishing a goal-based LSLR program, strengthening CCT requirements, and tailoring water quality parameters to the specific CCT plan for each water system.

The report NDWAC provided for EPA also included recommendations for renewed collaborative commitments between government and all levels of the public from state and local agencies, to other stakeholders and consumers while recognizing EPA's leadership role in this area. These complementary actions as well as a detailed description of the provisions for NDWAC's recommendations for the long-term revisions to the LCR can be found in the ''Report of the Lead and Copper Rule Working Group to the National Drinking Water Advisory Council'' (NDWAC, 2015). EPA took into consideration NDWAC's recommendations when developing these revisions to the LCR.

On December 4–5, 2019, EPA held a NDWAC meeting in Washington, DC where EPA presented the proposed Lead and Copper Rule Revisions (LCRR). In the presentation, the major LCRR revisions were highlighted such as the LSL inventory, the new trigger level of 10 ppb, and new sampling protocols. The presentation focused on six key areas: Identifying areas most impacted, strengthening treatment requirements, replacing LSLs, increasing sampling reliability, improving risk communication, and protecting children in schools. EPA reiterated that the LCRR was developed with extensive consultation from state, local and tribal partners to identify avenues that would reduce elevated levels of lead in drinking water. EPA reaffirmed its commitment to transparency and improved communication to the public.

M. Consultation With the Department of Health and Human Services Under SDWA Section 1412(d)

On June 12, 2019, EPA consulted with the Department of Health and Human Services (HHS) on the proposed LCRR. On July 22, 2020, EPA consulted with the Department of Health and Human Services (HHS) on the final rule. EPA received and considered comments from the HHS for both the proposal and final rules through the inter-agency review process described in section VII.A of this preamble.

N. Congressional Review Act (CRA)

This action is subject to the CRA, and the EPA will submit a rule report to each House of the Congress and to the Comptroller General of the United States. This action is a ''major rule'' as defined by 5 U.S.C. 804(2).

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List of Subjects

40 CFR Part 141

Environmental protection, Copper, Indians—lands, Intergovernmental relations, Lead, Lead service line, National Primary Drinking Water Regulation, Reporting and recordkeeping requirements, Water supply.

40 CFR Part 142

Environmental protection, Administrative practice and procedure, Copper, Indians—lands, Intergovernmental relations, Lead, Lead service line, National Primary Drinking Water Regulation, Reporting and recordkeeping requirements, Water supply.

Andrew Wheeler,

Administrator.

For the reasons stated in the preamble, the Environmental Protection Agency amends 40 CFR parts 141 and 142 as follows:

PART 141—NATIONAL PRIMARY DRINKING WATER REGULATIONS

■ 1. The authority citation for part 141 continues to read as follows:

Authority: 42 U.S.C. 300f, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–4, 300j–9, and 300j–11.

■ 2. Amend § 141.2 by:

■ a. Revising the definition of ''Action level'';

■ b. Adding in alphabetical order the definitions of ''Aerator'', ''Child care facility'', ''Elementary schools'', ''Fifth liter sample'', and ''Find-and-fix'';

■ c. Revising the definition for ''First draw sample'';

■ d. Adding in alphabetical order the definitions of ''Full lead service line replacement,'' ''Galvanized service line'', and ''Gooseneck, pigtail, or connector'';

■ e. Revising the definition of ''Lead service line'';

■ f. Adding in alphabetical order the definitions of ''Lead status unknown service line'' and ''Lead trigger level'';
■ g. Revising the definition of ''Medium-size water system'';
■ h. Adding in alphabetical order the definitions of ''Method detection limit (MDL)'', ''Partial lead service line replacement'', and ''Pitcher filter'';
■ i. Removing the definition of ''Point-of-use treatment device (POU)'';
■ j. Adding in alphabetical order the definitions ''Point-of-use treatment device or point of use device (POU),'' ''Practical quantitation limit (PQL)'', ''Pre-stagnation flushing'', ''School'', and ''Secondary school''.
■ k. Removing the definition ''Service line sample''.
l. Adding in alphabetical order the definitions ''System without corrosion control treatment'', ''Tap sampling monitoring period'', ''Tap sampling period'', ''Tap sampling protocol'', and ''Wide-mouth bottles''.

The revisions and additions read as follows:

§ 141.2 Definitions.

* * * * *

Action level means the concentrations of lead or copper in water as specified in § 141.80(c) which determines requirements under subpart I of this part. The action level for lead is 0.015 mg/L and the action level for copper is 1.3 mg/L.

Aerator means the device embedded in the water faucet to enhance air flow with the water stream and to prevent splashing.

* * * * *

Child care facility means a location that houses a licensed provider of child care, day care, or early learning services to children, as determined by the State, local, or tribal licensing agency.

* * * * *

Elementary school, for the purposes of subpart I of this part only, means a *school* classified as elementary by state and local practice and composed of any span of grades (including pre-school) not above grade 8.

* * * * *

Fifth liter sample, for purposes of subpart I of this part, means a one-liter sample of tap water collected in accordance with § 141.86(b).

* * * * *

Find-and-fix means the requirements under subpart I of this part that water systems must perform at every tap sampling site that yielded a lead result above 15 µg/L.

* * * * *

First draw sample means the first one-liter sample of tap water collected in accordance with § 141.86(b)(2).

* * * * *

Full lead service line replacement means the replacement of a *lead service line* (as well as galvanized service lines requiring replacement), as defined in this section, that results in the entire length of the service line, regardless of service line ownership, meeting the Safe Drinking Water Act (SDWA) Section 1417 definition of lead free applicable at the time of the replacement. A *full lead service line replacement* includes a replacement where only one portion of the service line is lead, such as where a partial lead service line was previously conducted, as long as, upon completion of the replacement, the entire service line meets the SDWA Section 1417 definition of lead-free applicable at the time of the replacement. Galvanized service lines that are or were downstream of a lead service line must also be replaced for a service line to be a *full lead service line replacement.* A lead service line that is left in place in the ground but remains out-of-service may be *full lead service line replacement* where a new non-lead service line is installed for use instead of the out-of-service lead service line.

* * * * *

Galvanized service line means iron or steel piping that has been dipped in zinc to prevent corrosion and rusting.

Gooseneck, pigtail, or connector is a short section of piping, typically not exceeding two feet, which can be bent and used for connections between rigid service piping. For purposes of this subpart, lead goosenecks, pigtails, and connectors are not considered to be part of the lead service line but may be required to be replaced pursuant to § 141.84(c).

* * * * *

Lead service line means a portion of pipe that is made of lead, which connects the water main to the building inlet. A lead service line may be owned by the water system, owned by the property owner, or both. For the purposes of this subpart, a galvanized service line is considered a lead service line if it ever was or is currently downstream of any lead service line or service line of unknown material. If the only lead piping serving the home is a lead gooseneck, pigtail, or connector, and it is not a galvanized service line that is considered a lead service line the service line is not a lead service line. For purposes of § 141.86(a) only, a galvanized service line is not considered a lead service line.

Lead status unknown service line means a service line that has not been demonstrated to meet or not meet the SDWA Section 1417 definition of lead free. It is not necessary to physically verify the material composition (for example, copper or plastic) of a service line for its lead status to be identified (*e.g.,* records demonstrating the service line was installed after a municipal, State, or Federal lead ban).

Lead trigger level means a particular concentration of lead in water that prompts certain activities under subpart I of this part. The trigger level for lead is a concentration of 10 µg/L.

* * * * *

Medium-size water system, for the purpose of subpart I of this part only, means a water system that serves greater than 10,000 persons and less than or equal to 50,000 persons.

* * * * *

Method detection limit (MDL) means the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

* * * * *

Partial lead service line replacement means replacement of any portion of a lead service line or galvanized service line requiring replacement, as defined in this section, that leaves in service any length of lead service line or galvanized service line requiring replacement upon completion of the work. Partial lead service line replacements are permitted under limited circumstances under § 141.84(d) but do not count towards the mandatory or goal-based lead service line replacement rate.

* * * * *

Pitcher filter means a non-plumbed water filtration device which consists of a gravity fed water filtration cartridge and a filtered drinking water reservoir that is certified by an American National Standards Institute accredited certifier to reduce lead in drinking water.

* * * * *

Point-of-use treatment device or point of use device (POU) is a water treatment device physically installed or connected to a single fixture, outlet, or tap to reduce or remove contaminants in drinking water. For the purposes of subpart I of this part, it must be certified by an American National Standards Institute accredited certifier to reduce lead in drinking water.

Practical quantitation limit (PQL) means the minimum concentration of an analyte (substance) that can be

measured with a high degree of confidence that the analyte is present at or above that concentration.

* * * * *

Pre-stagnation flushing is the opening of tap(s) to flush standing water from plumbing prior to the minimum 6-hour stagnation period in anticipation of lead and copper tap sampling under subpart I of this part.

* * * * *

School, for the purpose of subpart I of this part only, means any building(s) associated with public, private, or charter institutions that primarily provides teaching and learning for elementary or secondary students.

* * * * *

Secondary school, for the purpose of subpart I of this part only, means a *school* comprising any span of grades beginning with the next grade following an elementary or middle school (usually 7, 8, or 9) and ending with or below grade 12. Both junior high schools and senior high schools are included.

* * * * *

System without corrosion control treatment means a public water system that does not have or purchases all of its water from a system that does not have:

(1) An optimal corrosion control treatment approved by the State; or

(2) Any pH adjustment, alkalinity adjustment, and/or corrosion inhibitor addition resulting from other water quality adjustments as part of its treatment train infrastructure.

Tap sampling monitoring period, for the purposes of subpart I of this part, means the period of time during which each water system must conduct tap sampling for lead and copper analysis. A tap sampling monitoring period is determined by lead and copper concentrations in tap samples and the frequency can range from every six months (*i.e.,* semi-annual) up to once every nine years. Water systems on semi-annual tap sampling monitoring must collect samples no less frequently than every six months while those on annual monitoring must sample no less frequently than every year. Water systems on triennial monitoring must collect samples no less frequently than every three years; and those on monitoring waivers must sample no less frequently than every nine years. The start of each new tap sampling monitoring period, with the exception of semi-annual monitoring, must begin on January 1.

Tap sampling period, for the purpose of subpart I of this part only, means the time period, within a tap sampling monitoring period, during which the water system is required to collect samples for lead and copper analysis. For systems monitoring at a reduced frequency, the tap sampling period must be between the months of June and September, unless a different 4-month period of time is approved in writing to be more appropriate by the State.

Tap sampling protocol means the instructions given to residents or those sampling on behalf of the water system to conduct tap sampling under subpart I of this part.

* * * * *

Wide-mouth bottles, for the purpose of subpart I of this part only, means bottles configured with a mouth that is at least 55 mm wide that are one liter in size.

■ 3. Amend § 141.28 by revising paragraph (a) to read as follows:

§ 141.28 Certified laboratories.

(a) For the purpose of determining compliance with § 141.21 through 141.27, 141.30, 141.40, 141.74, 141.89 and 141.402, samples may be considered only if they have been analyzed by a laboratory certified by the State except that measurements of alkalinity, disinfectant residual, orthophosphate, pH, silica, temperature, and turbidity may be performed by any person acceptable to the State.

* * * * *

■ 4. Amend § 141.31 by revising paragraph (d) to read as follows:

§ 141.31 Reporting requirements.

* * * * *

(d)(1) The public water system, within 10 days of completing the public notification requirements under subpart Q of this part for the initial public notice and any repeat notices, must submit to the primary agency a certification that it has fully complied with the public notification regulations. For Tier 2 and 3 notices, the public water system must include with this certification a representative copy of each type of notice distributed, published, posted, and made available to the persons served by the system and to the media.

(2) For Tier 1 notices for a lead action level exceedance, public water systems must provide a copy of any Tier 1 notice to the Administrator and the head of the primacy agency as soon as practicable, but not later than 24 hours after the public water system learns of the violation or exceedance.

* * * * *

■ 5. Amend § 141.80 by:

■ a. Revising paragraphs (a), (b), (c), and (d)(1);

■ b. Adding paragraphs (d)(3) and (4);

■ c. Revising paragraphs (e), (f), (g), and (k); and

■ d. Adding paragraph (l).

The revisions and additions read as follows:

§ 141.80 General requirements.

(a) *Applicability, effective date, and compliance deadlines.* The requirements of this subpart constitute the national primary drinking water regulations for lead and copper.

(1) The provisions of this subpart apply to community water systems and non-transient, non-community water systems (in this subpart referred to as ''water systems'' or ''systems'') as defined at § 141.2.

(2) The requirements of this subpart are effective as of March 16, 2021.

(3) Community water systems and non-transient, non-community water systems must comply with the requirements of this subpart no later than January 16, 2024, except where otherwise specified at §§ 141.81, 141.84, 141.85, 141.86, and 141.90, or where an exemption in accordance with 40 CFR part 142, subpart C or F, has been established by the Administrator.

(4)(i) Between March 16, 2021 and January 16, 2024, community water systems and non-transient, non-community water systems must comply with 40 CFR 141.80 through 141.91, as codified on July 1, 2020.

(ii) If an exemption from subpart I of this part has been issued in accordance with 40 CFR part 142, subpart C or F, prior to March 16, 2021, then the water systems must comply with 40 CFR 141.80 through 141.91, as codified on July 1, 2020, until the expiration of that exemption.

(b) *Scope.* The regulations in this subpart establish a treatment technique that includes requirements for corrosion control treatment, source water treatment, lead service line inventory, lead service line replacement, public notice, monitoring for lead in schools and child care facilities, and public education. Several of the requirements in this subpart are prompted by the lead and copper action levels or the lead trigger level, specified in paragraph (c) of this section, as measured in samples collected at consumers' taps. The requirements for sampling for lead in schools and child care facilities and public education requirements in this subpart apply to all community water systems regardless of the results of the compliance tap sampling.

(c) *Lead trigger level, lead action level, and copper action level.* Trigger levels and action levels must be determined based on tap water samples collected in accordance with the tap sampling

monitoring requirements of § 141.86 for the purpose of calculating the 90th percentile and tested using the analytical methods specified in § 141.89. The trigger level and action levels described in this paragraph (c) are applicable to all sections of subpart I of this part. Trigger level and action levels for lead and copper are as follows:

(1) The *lead trigger level* is exceeded if the 90th percentile concentration of lead as specified in paragraph (c)(4) of this section is greater than 10 µg/L.

(2) The *lead action level* is exceeded if the 90th percentile concentration of lead as specified in paragraph (c)(4) of this section is greater than 15 µg/L.

(3) The *copper action level* is exceeded if the 90th percentile concentration of copper as specified in paragraph (c)(4) of this section is greater than 1.3 mg/L.

(4) For purposes of this subpart, the *90th percentile concentration* shall be computed as follows:

(i) For systems that do not have lead service line sites and only have sites identified as Tier 3, 4, or 5 under § 141.86(a).

(A) The results of all lead or copper samples taken during a tap sampling period shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Each sampling result shall be assigned a number, ascending by single integers beginning with the number 1 for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total number of samples taken.

(B) The number of samples taken during the tap sampling period shall be multiplied by 0.9.

(C) The contaminant concentration in the numbered sample yielded by the calculation in paragraph (c)(4)(i)(B) of this section is the 90th percentile concentration.

(D) For water systems serving fewer than 100 people that collect 5 samples per tap sampling period, the 90th percentile concentration is the average of the highest and second highest concentration.

(E) For a public water system that has been allowed by the State to collect fewer than five samples in accordance with § 141.86(c), or has failed to collect five samples, the sample result with the highest concentration is considered the 90th percentile value.

(ii) For public water systems with lead service lines with sites identified as Tier 1 or 2 under § 141.86(a) with enough Tier 1 or 2 sites to meet the minimum number of sites listed in § 141.86(c):

(A) The results of all lead or copper samples taken at Tier 1 or Tier 2 sites during a tap sampling period shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Sample results from Tier 3, 4, or 5 sites shall not be included in this calculation. Each sampling result shall be assigned a number, ascending by single integers beginning with the number 1 for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total number of samples taken.

(B) The number of samples taken at Tier 1 or Tier 2 sites during the tap sampling period shall be multiplied by 0.9.

(C) The contaminant concentration in the numbered sample yielded by the calculation in paragraph (c)(4)(ii)(B) of this section is the 90th percentile concentration.

(D) For water systems serving fewer than 100 people that collect 5 samples per tap sampling period, the 90th percentile concentration is the average of the highest and second highest concentration.

(E) For a public water system that has been allowed by the State to collect fewer than five samples in accordance with § 141.86(c), or has failed to collect five samples, the sample result with the highest concentration is considered the 90th percentile value.

(iii) For systems with lead service lines with sites identified as Tier 1 or 2 under § 141.86(a) with insufficient number of Tier 1 or 2 sites to meet the minimum number of sites listed in § 141.86(c):

(A) The results of all lead or copper samples taken at Tier 1 or Tier 2 sites along with the highest results from Tier 3, 4, or 5 sites sufficient to meet the minimum number of sites shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Sample results from any remaining Tier 3, 4, and 5 sites shall not be included in this calculation. Each sampling result shall be assigned a number, ascending by single integers beginning with the number 1 for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total minimum number of sites listed in § 141.86(c).

(B) The required minimum number of sites listed in § 141.86(c) shall be multiplied by 0.9.

(C) The contaminant concentration in the numbered sample yielded by the calculation in paragraph (c)(4)(iii)(B) is the 90th percentile concentration.

(D) For water systems serving fewer than 100 people that collect 5 samples per tap sampling period, the 90th percentile concentration is the average of the highest and second highest concentration.

(E) For a public water system that has been allowed by the State to collect fewer than five samples in accordance with § 141.86(c), or has failed to collect five samples, the sample result with the highest concentration is considered the 90th percentile value.

(d) *Corrosion control requirements.* (1) All water systems shall install and operate corrosion control treatment in accordance with §§ 141.81 and 141.82, and that meets the definition of *optimal corrosion control treatment* at § 141.2.

* * * * *

(3) Any small or non-transient non-community water system that complies with the applicable small system compliance flexibility requirements specified by the State under §§ 141.81(a)(3) and 141.93 is deemed to be in compliance with the treatment requirement in paragraph (d)(1) of this section.

(4) Any water system shall notify the State in writing pursuant to § 141.90(a)(3) of any upcoming long-term change in treatment or addition of a new source as described in § 141.90(a)(3). The State must review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water system. The State may require any such water system to conduct additional monitoring or to take other action the State deems appropriate to ensure that such water system maintains minimal levels of corrosion control in its distribution system.

(e) *Source water requirements.* (1) Any system exceeding the lead or copper action level shall implement all applicable source water treatment requirements specified by the State under § 141.83.

(2) Any system that changes their source water or makes long-term treatment changes shall submit written documentation to the State describing the change in accordance with §§ 141.81(a)(3), 141.86(d)(2)(iv), and 141.90(a)(3). The State must review and approve the change before it is implemented by the water system.

(f) *Lead service line replacements and inventory.* Lead service line replacements must be conducted as follows:

(1) Any water system exceeding the lead action level specified at paragraph

(c) of this section must complete mandatory lead service line replacement. Lead service line replacement must be conducted in accordance with § 141.84(g) and must include public education pursuant to § 141.85(a) and (b).

(2) Any water system exceeding the lead trigger level specified at paragraph (c) of this section must complete goal-based lead service line replacement pursuant to § 141.84(f) and public education pursuant to § 141.85(g) and (h).

(3) All water systems must prepare an inventory of service lines connected to its distribution system, whether or not they are owned or controlled by the water system, to identify those service lines that are made of lead or of unknown material. The inventory must be prepared in accordance with § 141.84(a).

(g) *Public education and notification requirements.* Pursuant to § 141.85(d), all water systems must provide notification of lead tap water monitoring results to persons served at the sites (taps) that are tested. All community water systems must conduct annual outreach to local and State health agencies pursuant to § 141.85(i). In addition:

(1) Any water system exceeding the lead action level specified at paragraph (c) of this section shall implement the public education requirements in accordance with § 141.85(a) and (b).

(2) Any water system exceeding the lead trigger level specified at paragraph (c) of this section shall provide notification to all customers with a lead service line in accordance with § 141.85(g).

(3) Any water system exceeding the lead action level specified at paragraph (c) of this section shall notify the public in accordance with the public notification requirements in subpart Q of this part.

(4) Any water system with lead service lines, galvanized requiring replacement or lead status unknown service lines in their inventory as specified in § 141.84(a) shall inform all consumers with a lead service line, galvanized requiring replacement, or a lead status unknown service line in accordance with § 141.85(e).

(5) Any water system that fails to reach its goal lead service line replacement rate as required under § 141.84(f) shall conduct outreach activities in accordance with § 141.85(h).

* * * * *

(k) *Violation of national primary drinking water regulations.* Failure to comply with the applicable requirements of this section and §§ 141.81 through 141.93, including requirements established by the State pursuant to the provisions in this subpart, is a violation of the national primary drinking water regulations for lead and copper.

(l) *Testing in schools and child care facilities.* All community water systems must collect samples from all schools and child care facilities within its distribution system in accordance with § 141.92.

■ 6. Revise § 141.81 to read as follows:

§ 141.81 Applicability of corrosion control treatment steps to small, medium, and large water systems.

(a) *Corrosion control treatment.* This section sets forth when a system must complete the corrosion control treatment steps for systems in paragraph (d) or (e) of this section to optimize or re-optimize corrosion control treatment based on size, whether the system has corrosion control treatment, and whether it has exceeded the lead trigger and/or action level and/or the copper action level.

(1) *Large water system (serving >50,000 people).* (i) Large water systems with corrosion control treatment that exceed either the lead trigger level or copper action level shall complete the corrosion control treatment steps specified in paragraph (d) of this section.

(ii) Large water *systems without corrosion control treatment* with 90th percentile results as calculated in accordance with § 141.80(c)(4) that exceed either the lead practical quantitation level of 0.005 mg/L or the copper action level shall complete the corrosion control treatment steps specified in paragraph (e) of this section.

(iii) Large water systems with corrosion control treatment with 90th percentile results as calculated in accordance with § 141.80(c)(4) that exceed the lead practical quantitation level but do not exceed lead trigger level or the copper action level may be required by the State to complete the corrosion control treatment steps in paragraph (d) of this section.

(2) *Medium-size water systems (serving >10,000 and ≤50,000 people).* (i) Medium-size water systems with corrosion control treatment that exceed either the lead trigger level or copper action level shall complete the corrosion control treatment steps specified in paragraph (d) of this section.

(ii) Medium-size water *systems without corrosion control treatment* that exceed either the lead or copper action level shall complete the corrosion control treatment steps specified in paragraph (e) of this section.

(iii) Medium-size water *systems without corrosion control treatment* that exceed the lead trigger level but do not exceed the lead or copper action levels shall complete the treatment recommendation step specified in paragraph (e)(1) of this section (Step 1). The water system shall complete the remaining steps in paragraph (e) of this section if it subsequently exceeds either the lead or copper action level.

(3) *Small water systems (serving ≤10,000 people) and non-transient, non-community water systems.* (i) Small and non-transient non-community water systems with corrosion control treatment that exceed the lead trigger level or the lead action level but do not exceed the copper action level, shall complete the corrosion control treatment steps specified in paragraph (d) of this section, if corrosion control treatment is approved by the State as a compliance option under § 141.93(a).

(ii) Small and non-transient, non-community water systems with corrosion control treatment that exceed the copper action level shall complete the corrosion control treatment steps specified in paragraph (d) of this section.

(iii) Small and non-transient, non-community water *systems without corrosion control treatment* that exceed the lead action level shall complete the corrosion control treatment steps specified in paragraph (e) of this section if corrosion control treatment is approved by the State as a compliance option under § 141.93.

(iv) Small and non-transient, non-community water *systems without corrosion control treatment* that exceed the copper action level shall complete the corrosion control treatment steps specified in paragraph (e) of this section.

(b) *Systems deemed to have optimized corrosion control.* A system is deemed to have optimal corrosion control treatment (*OCCT*) or re-optimized *OCCT* if the system satisfies one of the criteria specified in paragraphs (b)(1) through (3) of this section. Any such system deemed to have *OCCT* under this paragraph and which has corrosion control treatment in place shall continue to operate and maintain that treatment and meet any additional requirements that the State determines to be appropriate to ensure *optimal corrosion control treatment* is maintained.

(1) A small or medium-size water system without corrosion control treatment is deemed to have optimal

corrosion control if the water system does not exceed the lead action level and copper action level during two consecutive 6-month tap sampling monitoring periods and thereafter remains at or below the lead trigger level and copper action level in all tap sampling periods conducted in accordance with § 141.86.

(2) A small or medium-size water system with corrosion control treatment is deemed to have optimal corrosion control treatment if the water system does not exceed the lead trigger level and copper action level during two consecutive 6-month monitoring periods conducted in accordance with § 141.86 and thereafter remains at or below the lead trigger level and copper action level in all tap sampling periods conducted in accordance with § 141.86. Small or medium-size systems with corrosion control treatment that exceed the lead trigger level but do not exceed the lead and copper action levels during two consecutive 6-month monitoring periods and thereafter remains at or below the lead and copper action levels in all tap sampling periods conducted in accordance with § 141.86 are deemed to have re-optimized *optimal corrosion control treatment* if the system meets the requirements of this section. Where the State has set optimal water quality parameters (OWQPs) under paragraph (d) or (e) of this section a system will not be eligible to be deemed to have optimized or re-optimized *OCCT* pursuant to paragraph (b) of this section.

(3) Any water system is deemed to have optimized or re-optimized corrosion control if it submits results of tap water monitoring in accordance with § 141.86 demonstrating that the 90th percentile tap water lead level is less than or equal to the lead practical quantitation level of 0.005 mg/L and does not exceed the copper action level for two consecutive 6-month tap sampling monitoring periods, and does not have optimal water quality parameters that were set by the State under paragraph (d) or (e) of this section. Any such system with 90th percentile tap sample results that thereafter exceeds the lead practical quantitation level or copper action level during any tap sampling period shall not be eligible to be deemed to have optimized *OCCT* in accordance with this paragraph (b)(3) without first completing the treatment steps specified in paragraph (d) or (e) of this section

(i) [Reserved]

(ii) Any water system deemed to have optimized corrosion control in accordance with this paragraph (b)(3) shall continue monitoring for lead and copper at the tap no less frequently than once every three calendar years using the reduced number of sites specified in § 141.86(c) and collecting samples at times and locations specified in § 141.86(d)(4)(v).

(iii) through (v) [Reserved]

(c) *Corrosion control steps completion for small and medium-size water systems without corrosion control treatment.* Any small or medium-sized system without corrosion control treatment required to complete the corrosion control steps in paragraph (e) of this section due to its exceedance of the lead or copper action level that does not exceed either the lead or copper action levels during each of two consecutive 6-month tap sample monitoring periods pursuant to § 141.86 prior to the start of Step 3 in paragraph (e)(3) of this section or Step 5 in paragraph (e)(5) of this section may cease completing the steps and is not required to complete Step 3 or Step 5, respectively, except that medium-sized systems with lead service lines and small systems with lead service lines that choose the corrosion control option pursuant to § 141.93 must complete a corrosion control treatment study under paragraph (e)(3)(i) of this section. Any system that initiates Step 5 must complete all remaining steps in paragraphs (e)(6) through (8) of this section and is not permitted to cease the steps. Any system that ceases the steps either prior to Step 3 or Step 5 and thereafter exceeds either the lead or copper action level shall not be permitted to cease the steps a second time and shall complete the applicable treatment steps beginning with the first treatment step which was not previously completed in its entirety. The State may require a water system to repeat treatment steps previously completed by the water system when the State determines that this is necessary to implement the treatment requirements of this section. The State must notify the system in writing of such a determination and explain the basis for its decision.

(d) *Treatment steps and deadlines for water systems re-optimizing corrosion control treatment.* Except as provided in paragraph (b) of this section or § 141.93, water systems with corrosion control treatment shall complete the following corrosion control treatment steps (described in the referenced portions of §§ 141.82, 141.86, and 141.87) by the indicated time periods.

(1) *Step 1.* (i) A water system other than those covered in paragraph (d)(1)(ii) of this section shall recommend re-optimized optimal corrosion control treatment (§ 141.82(c)) within six months after the end of the tap sampling period during which it exceeds either the lead trigger level or copper action level. States may approve modifications of the existing corrosion control treatment without a study for systems that exceed the lead trigger level, but do not exceed the lead or copper action level. The State shall specify re-optimized corrosion control treatment within six months of receiving the treatment recommendation. The system shall complete modifications to corrosion control treatment to have re-optimized corrosion control treatment installed within six months of the State specifying re-optimized corrosion control treatment.

(ii) A water system with lead service lines that exceeds the lead action level must harvest lead pipes from the distribution system and construct flow-through pipe loops and operate the loops with finished water within one year after the end of the tap sampling period during which it exceeds the lead action level. These water systems must proceed to Step 3 in paragraph (d)(3) of this section and conduct the corrosion control studies for re-optimization under paragraph (d)(3)(i) of this section using the pipe loops.

(2) *Step 2.* (i) Large water systems shall conduct the corrosion control studies for re-optimization under paragraph (d)(3) of this section (Step 3) unless the system is at or below the lead action level and the State has approved the modification of the existing corrosion control treatment made under paragraph (d)(3)(i) of this section (Step 1).

(ii) Within 12 months after the end of the tap sampling period during which a small or medium-size water system with corrosion control treatment exceeds the lead trigger level or copper action level, the State may require the water system to perform corrosion control studies for re-optimization (§ 141.82(c)(2) or (3)). If the State does not require the system to perform such studies, the State must specify re-optimized corrosion control treatment (§ 141.82(d)(2)) within the timeframes specified in paragraphs (d)(2)(ii)(A) and (B) of this section. The State must provide its determination to the system in writing.

(A) For medium-size water systems, within 12 months after the end of the tap sampling period during which such water system exceeds the lead trigger level or copper action level.

(B) For small water systems, within 18 months after the end of the tap sampling period during which such water system exceeds the lead trigger level or copper action level.

(3) *Step 3.* (i) Any water system with lead service lines that exceeded the lead action level shall complete the corrosion control treatment studies for re-optimization within 30 months after the end of the tap sampling period during which it exceeds the lead action level.

(ii) If the water system is required to perform corrosion control studies under paragraph (d)(2) of this section (Step 2), the water system shall complete the studies (§ 141.82(c)(2)) within 18 months after the State requires that such studies be conducted.

(4) *Step 4.* (i) The State shall designate re-optimized corrosion control treatment (§ 141.82(d)(3)) within six months after completion of paragraph (d)(3)(i) of this section (Step 3).

(ii) If the water system has performed corrosion control studies under paragraph (d)(2) of this section (Step 2), the State shall designate re-optimized corrosion control treatment (§ 141.82(d)(2) or (4)) within six months after completion of paragraph (d)(3)(ii) of this section (Step 3).

(5) *Step 5.* (i) Large water systems shall complete modifications to corrosion control treatment to have re-optimized corrosion control treatment installed within 12 months after completion of paragraph (d)(4)(i) of this section (Step 4).

(ii) Small or medium-size water systems shall install re-optimized corrosion control treatment (§ 141.82(e)(1)) within 12 months after completion of paragraph (d)(4)(ii) of this section (Step 4).

(6) *Step 6.* Water systems must complete follow-up sampling (§§ 141.86(d)(2) and 141.87(c)) within 12 months after completion of paragraph (d)(5)(i) or (ii) of this section (Step 5).

(7) *Step 7.* The State must review the water system's installation of treatment and designate optimal water quality control parameters (§ 141.82(f)(1)) within six months of completion of paragraph (d)(6) of this section (Step 6).

(8) *Step 8.* The water system must operate in compliance with the State-designated optimal water quality control parameters (§ 141.82(g)) and continue to conduct tap sampling (§ 141.86(d)(3) and water quality parameter monitoring under § 141.87(d)).

(e) *Treatment steps and deadlines for systems without corrosion control treatment.* Except as provided in paragraph (b) of this section or § 141.93, water systems without corrosion control treatment must complete the following corrosion control treatment steps (described in the referenced portions of §§ 141.82, 141.86, and 141.87) by the indicated time periods.

(1) *Step 1.* (i) A water system other than those covered in paragraph (e)(1)(ii) or (iii) of this section must recommend optimal corrosion control treatment (§ 141.82(a)(1), (2), (3), or (4)) within six months after the end of the tap sampling period during which it exceeds either the lead trigger level or copper action level.

(ii) A water system with lead service lines that exceeds the lead action level must harvest lead pipes from the distribution system and construct flow-through pipe loops and operate the loops with finished water within one year after the end of the tap sampling period during which it exceeds the lead action level. These water systems must proceed to Step 3 in paragraph (e)(3) of this section and conduct the corrosion control studies for optimization under paragraph (e)(3)(i) of this section using the pipe loops.

(iii) Large water systems under paragraph (a)(1)(ii) of this section must conduct the corrosion control studies for optimization under paragraph (e)(3) of this section (Step 3).

(2) *Step 2.* Within 12 months after the end of the tap sampling period during which a water system exceeds the lead or copper action level, if not otherwise required by this rule, the State may require the water system to perform corrosion control studies (§ 141.82(b)(1)). The State must notify the system in writing of this requirement. If the State does not require the system to perform such studies, the State must specify optimal corrosion control treatment (§ 141.82(d)(1) or (2)) within the timeframes established in paragraphs (e)(2)(i) and (ii) of this section. The State must provide its determination to the system in writing.

(i) For medium-size water systems, within 18 months after the end of the tap sampling monitoring period during which such water system exceeds the lead trigger level or copper action level.

(ii) For small water systems, within 24 months after the end of the tap sampling monitoring period during which such water system exceeds the lead trigger level or copper action level.

(3) *Step 3.* (i) Large water systems with or without lead service line and medium or small systems with lead service lines that exceed the lead action level shall complete the corrosion control treatment studies for optimization within 30 months after the end of the tap sampling period during which it exceeds the lead action level.

(ii) If the State requires a water system to perform corrosion control studies under paragraph (e)(2) of this section (Step 2), the water system must complete the studies (§ 141.82(c)(1)) within 18 months after the State notifies the system in writing that such studies must be conducted.

(4) *Step 4.* (i) The State shall designate re-optimized corrosion control treatment (§ 141.82(d)(3)) within six months after completion of paragraph (d)(3)(i) of this section (Step 3).

(ii) If the water system has performed corrosion control studies under paragraph (e)(2) of this section (Step 2), the State must designate *optimal corrosion control treatment* (§ 141.82(d)(1)) within six months after completion of paragraph (e)(3) of this section (Step 3).

(5) *Step 5.* The water system must install *optimal corrosion control treatment* (§ 141.82(e)(1)) within 24 months after the State designates *optimal corrosion control treatment* under paragraph (e)(2) or (4) of this section (Step 2 or Step 4).

(6) *Step 6.* The water system shall complete follow-up sampling (§§ 141.86(d)(2)(i) and 141.87(c)) within 12 months after completion of paragraph (e)(5) of this section (Step 5).

(7) *Step 7.* The State must review the water system's installation of treatment and designate optimal water quality control parameters (§ 141.82(f)(1)) within six months of completion of paragraph (e)(6) of this section (Step 6).

(8) *Step 8.* The water system must operate in compliance with the State-designated optimal water quality control parameters (§ 141.82(g)(1)) and continue to conduct tap sampling (§ 141.86(d)(3) and water quality parameter monitoring under § 141.87(d)).

(f) *Treatment steps and deadlines for small community water systems and non-transient non-community water systems electing corrosion control treatment (CCT) as a compliance option under § 141.93, or as required by the State.* Water systems selecting the corrosion control small system compliance flexibility option must complete the following steps by the indicated time periods.

(1) *Step 1.* A water system recommends corrosion control treatment as a small system compliance flexibility option under § 141.93(a)(2) within six months after the end of the tap sampling period during which it exceeds either the lead trigger level or the lead action level.

(2) *Step 2.* The State approves in writing the recommendation of corrosion control treatment as a small system compliance flexibility option or designates an alternative option in accordance with § 141.93(a) within six months of the recommendation by the water system in paragraph (f)(1) of this

section (Step 1). Water systems required by the State to optimize or re-optimize corrosion control treatment must follow the schedules in paragraph (d) or (e) of this section, beginning with Step 3 in paragraph (d)(3) or (e)(3) of this section unless the State specifies optimal corrosion control treatment pursuant to either paragraph (d)(2)(ii) or (e)(2)(ii) of this section, as applicable.

■ 7. Revise § 141.82 to read as follows:

§ 141.82 Description of corrosion control treatment requirements.

This section sets forth the requirements applicable to systems and states in the designation of optimal corrosion control treatment for a system that is optimizing or reoptimizing corrosion control treatment. Each system must complete the corrosion control treatment requirements in this section as applicable to such system under § 141.81.

(a) *System recommendation regarding corrosion control treatment for systems that do not contain lead service lines and systems with lead service lines that do not exceed the lead action level.* (1) Any system under this paragraph (a) without corrosion control treatment that is required to recommend a treatment option in accordance with § 141.81(e) must, based on the results of lead and copper tap sampling and water quality parameter monitoring, recommend designation of one or more of the corrosion control treatments listed in paragraph (c)(1)(i) of this section. Small community water systems and non-transient non-community water systems that exceed the copper action level must comply with this paragraph (a)(1). The State may require the system to conduct additional water quality parameter monitoring to assist the State in reviewing the system's recommendation.

(2) Any small community water system or non-transient non-community water system in this paragraph (a) without corrosion control treatment that chooses to pursue a small water system compliance flexibility option and is required to recommend an option in accordance with § 141.81(f) must, based on the results of lead tap sampling and water quality parameter monitoring, recommend designation of one of the options listed in § 141.93. Systems with no lead service lines that exceed the lead action level and select corrosion control under § 141.93(a)(2) must recommend designation of one or more of the corrosion control treatments listed in paragraph (c)(1) of this section as the optimal corrosion control treatment for that system.

(3) Any system under this paragraph (a) that exceeds the lead action level and selects corrosion control under § 141.93(a)(2) must recommend designation of one or more of the corrosion control treatments listed in paragraph (c)(1)(i) of this section as the optimal corrosion control treatment for that system. A corrosion control study under paragraph (c) of this section is not required for medium and small systems that exceed the lead trigger level but do not exceed the lead and copper action levels, unless required by the state.

(4) Any small community water system or non-transient, non-community water system with corrosion control treatment that that exceeds the lead action level and selects corrosion control under § 141.93(a)(2) must recommend designation of one or more of the corrosion control treatments listed in paragraph (c)(2) of this section as the optimal corrosion control treatment for that system.

(5) States may waive the requirement for a system to recommend OCCT if the State requires the system, in writing, to complete a corrosion control study within 3 months after the end of the tap sampling period during which the exceedance occurred. Such systems shall proceed directly to paragraph (c) of this section and complete a corrosion control study.

(b) *State decision to require studies to identify initial optimal corrosion control treatment and re-optimized optimal corrosion control treatment except for large systems and small and medium systems with lead service lines that exceed the lead action level.* Corrosion control treatment studies are always required for large systems that exceed the lead action level, large water *systems without corrosion control treatment* with 90th percentile results that exceed either the lead practical quantitation level of 0.005 mg/L or the copper action level, medium sized systems with lead service lines that exceed the lead action level, and small systems with lead service lines that exceed the lead action level and select the corrosion control treatment option under § 141.93(a).

(1) The State may require any small or medium-size system without corrosion control that exceeds either the lead or copper action level to perform corrosion control treatment studies under paragraph (c)(1) of this section to identify *optimal corrosion control treatment* for the system.

(2) The State may require any small or medium-size system without corrosion control that exceeds the lead trigger level but not the lead or copper action level to perform corrosion control treatment studies under paragraph (c)(1) of this section to identify *optimal corrosion control treatment* for the system. This corrosion control treatment shall be installed if the lead or copper action level is subsequently exceeded.

(3) The State may require any small or medium-size water systems with corrosion control treatment exceeding either the lead trigger level or copper action level to perform corrosion control treatment studies under paragraph (c)(2) of this section to identify re-optimized optimal corrosion control treatment for the system (*i.e.,* optimal corrosion control treatment after a re-optimization evaluation).

(c) *Performance of corrosion control studies.* (1) Water systems without corrosion control treatment that are required to conduct corrosion control studies must complete the following:

(i) Any water system without corrosion control treatment must evaluate the effectiveness of each of the following treatments, and if appropriate, combinations of the following treatments to identify the optimal corrosion control treatment for the system:

(A) Alkalinity and pH adjustment;

(B) The addition of an orthophosphate- or silicate-based corrosion inhibitor at a concentration sufficient to maintain an effective corrosion inhibitor residual concentration in all test samples;

(C) The addition of an orthophosphate-based corrosion inhibitor at a concentration sufficient to maintain an orthophosphate residual concentration of 1 mg/L (as PO4) in all test samples; and

(D) The addition of an orthophosphate-based corrosion inhibitor at a concentration sufficient to maintain an orthophosphate residual concentration of 3 mg/L (as PO_4) in all test samples.

(ii) The water system must evaluate each of the corrosion control treatments using either pipe rig/loop tests, metal coupon tests, partial-system tests, or analyses based on documented analogous treatments with other systems of similar size, water chemistry, and distribution system configurations. Large and medium systems and small community water systems and non-transient non-community water systems that select the corrosion control treatment option under § 141.93 with lead service lines that exceed the lead action level must conduct pipe rig/loop studies using harvested lead service lines from their distribution systems to assess the effectiveness of corrosion control treatment options on the existing pipe scale. For these systems,

metal coupon tests can be used as a screen to reduce the number of options that are evaluated using pipe rig/loops to the current conditions and two options.

(iii) The water system must measure the following water quality parameters in any tests conducted under this paragraph (c)(1)(iii) before and after evaluating the corrosion control treatments listed in paragraphs (c)(1)(i) and (ii) of this section:

(A) Lead;

(B) Copper;

(C) pH;

(D) Alkalinity;

(E) Orthophosphate as PO_4 (when an orthophosphate-based inhibitor is used); and

(F) Silicate (when a silicate-based inhibitor is used).

(iv) The water system must identify all chemical or physical constraints that limit or prohibit the use of a particular corrosion control treatment and document such constraints with one of the following:

(A) Data and documentation showing that a particular corrosion control treatment has adversely affected other drinking water treatment processes when used by another water system with comparable water quality characteristics. Systems using coupon studies to screen and/or pipe loop/rig studies to evaluate treatment options must not exclude treatment strategies from the studies based on the constraints identified in this section.

(B) Data and documentation demonstrating that the water system has previously attempted to evaluate a particular corrosion control treatment and has found that the treatment is ineffective or adversely affects other drinking water quality treatment processes. Systems using coupon studies to screen and/or pipe loop/rig studies to evaluate treatment options must not exclude treatment strategies from the studies based on the constraints identified in this section unless the treatment was found to be ineffective in a previous pipe loop/rig study.

(v) The water system must evaluate the effect of the chemicals used for corrosion control treatment on other drinking water quality treatment processes. Systems using coupon studies to screen and/or pipe loop/rig studies to evaluate treatment options shall not exclude treatment strategies from the studies based on the effects identified in this section.

(vi) On the basis of an analysis of the data generated during each evaluation, the water system must recommend to the State in writing the treatment option that the corrosion control studies indicate constitutes *optimal corrosion control treatment* for that system as defined in § 141.2. The water system must provide a rationale for its recommendation along with all supporting documentation specified in paragraphs (c)(2)(i) through (v) of this section.

(2) Systems with corrosion control treatment that are required to conduct corrosion control studies to determine re-optimized *OCCT* must complete the following:

(i) The water system must evaluate the effectiveness of the following treatments, and if appropriate, combinations of the following treatments to identify the re-optimized *optimal corrosion control treatment* for the system:

(A) Alkalinity and/or pH adjustment, or re-adjustment;

(B) The addition of an orthophosphate- or silicate-based corrosion inhibitor at a concentration sufficient to maintain an effective corrosion inhibitor residual concentration in all test samples if no such inhibitor is utilized;

(C) The addition of an orthophosphate-based corrosion inhibitor at a concentration sufficient to maintain an orthophosphate residual concentration of 1 mg/L (PO_4) in all test samples unless the current inhibitor process already meets this residual; and

(D) The addition of an orthophosphate-based corrosion inhibitor at a concentration sufficient to maintain an orthophosphate residual concentration of 3 mg/L (PO_4) in all test samples unless the current inhibitor process already meets this residual.

(ii) The water system must evaluate each of the corrosion control treatments using either pipe rig/loop tests, metal coupon tests, partial-system tests, or analyses based on documented analogous treatments with other systems of similar size, water chemistry, and distribution system configurations. If the water system has lead service lines and exceeds the lead action level, it must conduct pipe rig/loop studies using harvested lead service lines from their distribution systems to assess the effectiveness of corrosion control treatment options on the existing pipe scale. For these systems, metal coupon tests can be used as a screen to reduce the number of options that are evaluated using pipe rig/loops to the current conditions and two options.

(iii) The water system must measure the following water quality parameters in any tests conducted under this paragraph (c)(2)(iii) before and after evaluating the corrosion control treatments listed in paragraphs (c)(2)(i) and (ii) of this section:

(A) Lead;

(B) Copper;

(C) pH;

(D) Alkalinity;

(E) Orthophosphate as PO_4 (when an orthophosphate-based inhibitor is used); and

(F) Silicate (when a silicate-based inhibitor is used).

(iv) The water system must identify all chemical or physical constraints that limit or prohibit the use of a particular corrosion control treatment and document such constraints with one of the following:

(A) Data and documentation showing that a particular corrosion control treatment has adversely affected other drinking water treatment processes when used by another water system with comparable water quality characteristics. Systems using coupon studies to screen and/or pipe loop/rig studies to evaluate treatment options must not exclude treatment strategies from the studies based on the constraints identified in this section.

(B) Data and documentation demonstrating that the water system has previously attempted to evaluate a particular corrosion control treatment and has found that the treatment is ineffective or adversely affects other drinking water quality treatment processes. Systems using coupon studies to screen and/or pipe loop/rig studies to evaluate treatment options shall not exclude treatment strategies from the studies based on the constraints identified in this section unless the treatment was found to be ineffective in a previous pipe loop/rig study.

(v) The water system must evaluate the effect of the chemicals used for corrosion control treatment on other drinking water quality treatment processes. Systems using coupon studies to screen and/or pipe loop/rig studies to evaluate treatment options shall not exclude treatment strategies from the studies based on the effects identified in this section.

(vi) On the basis of an analysis of the data generated during each evaluation, the water system must recommend to the State in writing the treatment option that the corrosion control studies indicate constitutes *optimal corrosion control treatment* for that system as defined in § 141.2. The water system must provide a rationale for its recommendation along with all supporting documentation specified in paragraph (c)(1)(i) through (v) of this section.

(d) *State designation of optimized optimal corrosion control treatment and re-optimized optimal corrosion control treatment.* When designating optimal corrosion control treatment, the State must consider the effects that additional corrosion control treatment will have on water quality parameters and on other drinking water quality treatment processes. The State must notify the water system of its designation of *optimal corrosion control treatment* in writing and explain the basis for this determination. If the State requests additional information to aid its review, the water system must provide the information.

(1) *Designation of OCCT for systems without corrosion control treatment.* Based upon considerations of available information including, where applicable, studies conducted under paragraph (c)(1) of this section and/or a system's recommended corrosion control treatment option, the State must either approve the corrosion control treatment option recommended by the system or designate alternative corrosion control treatment(s) from among those listed in paragraph (c)(1)(i) of this section or, where applicable, an alternate *small water system compliance flexibility* option under § 141.93(a).

(2) *Designation of re-optimized OCCT for systems with corrosion control treatment.* Based upon considerations of available information including, where applicable, studies conducted under paragraph (c)(2) of this section and/or a system's recommended treatment alternative, the State must either approve the corrosion control treatment option recommended by the water system or designate alternative corrosion control treatment(s) from among those listed in paragraph (c)(2)(i) of this section or, where applicable, an alternate *small water system compliance flexibility* option under § 141.93.

(e) *Installation of optimal corrosion control treatment and re-optimization of corrosion control treatment.* Each system must properly install and operate throughout its distribution system the *optimal corrosion control treatment* designated by the State under paragraph (d) of this section.

(f) *State review of treatment and specification of optimal water quality control parameters for optimal corrosion control treatment and re-optimized corrosion control treatment.* The State must evaluate the results of all lead and copper tap sampling and water quality parameter sampling submitted by the water system and determine whether the water system has properly installed and operated the optimal corrosion control treatment designated by the State in paragraph (d)(1) or (2) of this section, respectively. Upon reviewing the results of tap water and water quality parameter monitoring by the water system, both before and after the water system installs optimal corrosion control treatment, the State must designate:

(1) A minimum value or a range of values for pH measured at each entry point to the distribution system.

(2) A minimum pH value measured in all tap samples. Such a value shall be equal to or greater than 7.0, unless the State determines that meeting a pH level of 7.0 is not technologically feasible or is not necessary for the system to optimize corrosion control.

(3) If a corrosion inhibitor is used, a minimum concentration or a range of concentrations for orthophosphate (as PO_4) or silicate measured at each entry point to the distribution system.

(4) If a corrosion inhibitor is used, a minimum orthophosphate or silicate concentration measured in all tap samples that the State determines is necessary to form a passivating film on the interior walls of the pipes of the distribution system. When orthophosphate is used, such an orthophosphate concentration shall be equal to or greater than 0.5 mg/L (asPO_4) for *OCCT* designations under paragraph (d)(1) of this section and 1.0 mg/L for *OCCT* designations under paragraph (d)(2) of this section, unless the State determines that meeting the applicable minimum orthophosphate residual is not technologically feasible or is not necessary for *optimal corrosion control treatment.*

(5) If alkalinity is adjusted as part of optimal corrosion control treatment, a minimum concentration or a range of concentrations for alkalinity, measured at each entry point to the distribution system and in all tap samples.

(6) The values for the applicable water quality control parameters, previously listed in this section, shall be those that the State determines to reflect *optimal corrosion control treatment* for the water system. The State may designate values for additional water quality control parameters determined by the State to reflect *optimal corrosion control treatment* for the water system. The State must notify the system in writing of these determinations and explain the basis for its decisions.

(g) *Continued operation and monitoring for optimal corrosion control treatment and re-optimized optimal corrosion control treatment.* All systems optimizing or re-optimizing corrosion control must continue to operate and maintain *optimal corrosion control treatment,* including maintaining water quality parameters at or above minimum values or within ranges designated by the State under paragraph (f) of this section, in accordance with this paragraph (g) for all samples collected under § 141.87(d) through (f). The requirements of this paragraph (g) apply to all systems, including consecutive systems that distribute water that has been treated to control corrosion by another system, and any water system with corrosion control treatment, *optimal corrosion control treatment,* or re-optimized *OCCT* that is not required to monitor water quality parameters under § 141.87. Compliance with the requirements of this paragraph (g) shall be determined every six months, as specified under § 141.87(d). A water system is out of compliance with the requirements of this paragraph (g) for a six-month period if it has excursions for any State-specified parameter on more than nine days, cumulatively, during the period. An excursion occurs whenever the daily value for one or more of the water quality parameters measured at a sampling location is below the minimum value or outside the range designated by the State. Daily values are calculated as set out in paragraphs (g)(1) through (3) of this section. States have discretion to not include results of obvious sampling errors from this calculation. Sampling errors must still be recorded even when not included in calculations.

(1) On days when more than one measurement for the water quality parameter is collected at the sampling location, the daily value must be the average of all results collected during the day regardless of whether they are collected through continuous monitoring, grab sampling, or a combination of both. If EPA has approved an alternative formula under § 142.16(d)(1)(ii) of this chapter in the State's application for a program revision submitted pursuant to § 142.12 of this chapter, the State's formula shall be used to aggregate multiple measurements taken at a sampling point for the water quality parameters in lieu of the formula in this paragraph (g)(1).

(2) On days when only one measurement for the water quality parameter is collected at the sampling location, the daily value shall be the result of that measurement.

(3) On days when no measurement is collected for the water quality parameter at the sampling location, the daily value shall be the daily value calculated on the most recent day on which the water quality parameter was measured at the sampling location.

(h) *Modification of State treatment decisions for optimal corrosion control*

and re-optimized corrosion control. Upon its own initiative or in response to a request by a water system or other interested party, a State may modify its determination of the optimal corrosion control treatment under paragraph (d) of this section, or optimal water quality control parameters under paragraph (f) of this section. A request for modification by a system or other interested party shall be in writing, explaining why the modification is appropriate, and providing supporting documentation. The State may modify its determination where it concludes that such change is necessary to ensure that the water system continues to optimize corrosion control treatment. A revised determination must be made in writing, set forth the new treatment requirements and/or water quality parameters, explain the basis for the State's decision, and provide an implementation schedule for completing the treatment modifications for re-optimized corrosion control treatment.

(i) *Treatment decisions by EPA in lieu of the State on optimal corrosion control treatment and re-optimized corrosion control treatment.* Pursuant to the procedures in § 142.19 of this chapter, EPA Regional Administrator may review optimal corrosion control treatment determinations made by a State under paragraph (d)(1) or (2), (f), or (h) of this section and issue Federal treatment determinations consistent with the requirements of paragraph (d)(1) or (2), (f), or (h) of this section where the Regional Administrator finds that:

(1) A State has failed to issue a treatment determination by the applicable deadlines contained in § 141.81;

(2) A State has abused its discretion in a substantial number of cases or in cases affecting a substantial population; or

(3) The technical aspects of a State's determination would be indefensible in a Federal enforcement action taken against a water system.

(j) *Find-and-fix assessment for tap sample sites that exceed the lead action level.* The water system shall conduct the following steps, when a tap sample site exceeds the lead action level under monitoring conducted under § 141.86.

(1) *Step 1: corrosion control treatment assessment.* The water system must sample at a new water quality parameter site that is on the same size water main in the same pressure zone and located within a half mile of the location with the action level exceedance within 5 days of receiving the sample results. Small water *systems without corrosion control treatment* may have up to 14 days to collect the samples. The water system must measure the following parameters:

(i) pH;

(ii) Alkalinity;

(iii) Orthophosphate (as PO_4), when an inhibitor containing an orthophosphate compound is used;

(iv) Silica, when an inhibitor containing a silicate compound is used; and

(v) Water systems with an existing water quality parameter location that meets the requirements of this section can conduct this sampling at that location.

(vi) All water systems required to meet optimal water quality control parameters but that do not have an existing water quality parameter location that meets the requirement of this section must add new sites to the minimum number of sites as described in § 141.87(g). Sites must be added until a system has twice the minimum number of sites listed in Table 1 to § 141.87(a)(2). When a system exceeds this upper threshold for the number of sites, the State has discretion to determine if the newer site can better assess the effectiveness of the corrosion control treatment and to remove existing sites during sanitary survey evaluation of OCCT.

(2) *Step 2: Site assessment.* Water systems shall collect a follow-up sample at any tap sample site that exceeds the action level within 30 days of receiving the sample results. These follow-up samples may use different sample volumes or different sample collection procedures to assess the source of elevated lead levels. Samples collected under this section must be submitted to the State but shall not be included in the 90th percentile calculation for compliance monitoring under § 141.86. If the water system is unable to collect a follow-up sample at a site, the water system must provide documentation to the State, explaining why it was unable to collect a follow-up sample.

(3) *Step 3.* Water systems shall evaluate the results of the monitoring conducted under this paragraph (j)(3) to determine if either localized or centralized adjustment of the *optimal corrosion control treatment* or other distribution system actions are necessary and submit the recommendation to the State within six months after the end of the tap sampling period in which the site(s) exceeded the lead action level. Corrosion control treatment modification may not be necessary to address every exceedance. Other distribution system actions may include flushing to reduce water age. Water systems must note the cause of the elevated lead level, if known from the site assessment, in their recommendation to the State as site-specific issues can be an important factor in why the system is not recommending any adjustment of corrosion control treatment or other distribution system actions. Systems in the process of optimizing or re-optimizing optimal corrosion control treatment under paragraphs (a) through (f) of this section do not need to submit a treatment recommendation for find-and-fix.

(4) *Step 4.* The State shall approve the treatment recommendation or specify a different approach within six months of completion of Step 3 as described in paragraph (j)(3) of this section.

(5) *Step 5.* If the State-approved treatment recommendation requires the water system to adjust the *optimal corrosion control treatment* process, the water system must complete modifications to its corrosion control treatment within 12 months after completion of Step 4 as described in paragraph (j)(4) of this section. Systems without corrosion control treatment required to install *optimal corrosion control treatment* must follow the schedule in § 141.81(e).

(6) *Step 6.* Water systems adjusting its *optimal corrosion control treatment* must complete follow-up sampling (§§ 141.86(d)(2) and 141.87(c)) within 12 months after completion of Step 5 as described in paragraph (j)(5) of this section.

(7) *Step 7.* For water systems adjusting its *optimal corrosion control treatment,* the State must review the water system's modification of corrosion control treatment and designate optimal water quality control parameters (§ 141.82(f)(1)) within six months of completion of Step 6 as described in paragraph (j)(6) of this section.

(8) *Step 8.* For a water system adjusting its *optimal corrosion control treatment,* the water system must operate in compliance with the State-designated optimal water quality control parameters (§ 141.82(g)) and continue to conduct tap sampling (§§ 141.86(d)(3) and 141.87(d)).

■ 8. Revise § 141.84 to read as follows:

§ 141.84 Lead service line inventory and replacement requirements.

(a) *Lead service line inventory.* All water systems must develop an inventory to identify the materials of service lines connected to the public water distribution system. The inventory must meet the following requirements:

(1) All water systems must develop an initial inventory by January 16, 2024,

and submit it to the primacy agency in accordance with § 141.90.

(2) The inventory must include all service lines connected to the public water distribution system regardless of ownership status (*e.g.,* where service line ownership is shared, the inventory would include both the portion of the service line owned by the water system and the customer-owned portion of the service line).

(3) A water system must use any information on lead and galvanized iron or steel that it has identified pursuant to § 141.42(d) when conducting the inventory of service lines in its distribution system for the initial inventory under paragraph (a)(1) of this section. The water system must also review the sources of information listed in paragraphs (a)(3)(i) through (iv) of this section to identify service line materials for the initial inventory. The water system may use other sources of information not listed in paragraphs (a)(3)(i) through (iv) of this section if approved by the State.

(i) All construction and plumbing codes, permits, and existing records or other documentation which indicates the service line materials used to connect structures to the distribution system.

(ii) All water system records, including distribution system maps and drawings, historical records on each service connection, meter installation records, historical capital improvement or master plans, and standard operating procedures.

(iii) All inspections and records of the distribution system that indicate the material composition of the service connections that connect a structure to the distribution system.

(iv) Any resource, information, or identification method provided or required by the State to assess service line materials.

(4) Each service line, or portion of the service line where ownership is split, must be categorized in the following manner:

(i) ''Lead'' where the service line is made of lead.

(ii) ''Galvanized Requiring Replacement'' where a galvanized service line is or was at any time downstream of a lead service line or is currently downstream of a ''Lead Status Unknown'' service line. If the water system is unable to demonstrate that the galvanized service line was never downstream of a lead service line, it must presume there was an upstream lead service line.

(iii) ''Non-lead'' where the service line is determined through an evidence-based record, method, or technique not to be lead or galvanized requiring replacement. The water system may classify the actual material of the service line (*i.e.,* plastic or copper) as an alternative to classifying it as ''Non-lead.''

(iv) ''Lead Status Unknown'' where the service line material is not known to be lead, galvanized requiring replacement, or a non-lead service line, such as where there is no documented evidence supporting material classification. The water system may classify the line as ''Unknown'' as an alternative to classifying it as ''Lead Status Unknown,'' however, all requirements that apply to ''Lead Status Unknown'' service lines must also apply to those classified as ''Unknown.'' Water systems may elect to provide more information regarding their unknown lines as long as the inventory clearly distinguishes unknown service lines from those where the material has been verified through records or inspection.

(5) Water systems shall identify and track service line materials in the inventory as they are encountered in the course of its normal operations (*e.g.,* checking service line materials when reading water meters or performing maintenance activities).

(6) Water systems must update the inventory based on all applicable sources described in paragraphs (a)(3) and (5) of this section and any lead service line replacements or service line material inspections that may have been conducted. The water system may use other sources of information if approved by the State and must use other sources of information provided or required by the State. Water systems must submit the updated inventory to the State in accordance with § 141.90(e). The inventory updates must be reflected in the publicly accessible inventory no less frequently than when required to be submitted to the State.

(i) Water systems whose inventories contain only non-lead service lines are not required to provide inventory updates to the State or to the public. If, in the future, such a water system finds a lead service line within its system, it must prepare an updated inventory in accordance with paragraph (a) of this section on a schedule established by the State.

(ii) [Reserved]

(7) To calculate the number of service line replacements applicable to paragraphs (f) and (g) of this section, the replacement rate must be applied to the sum of known lead and galvanized requiring replacement service lines when the system first exceeds the trigger or action level plus the number of lead status unknown service lines in the beginning of each year of a system's annual goal or mandatory lead service line replacement program.

(i) Each service line shall count only once for purposes of calculating the required number of service line replacements, even where the ownership of the service line is split and both the customer-owned and system-owned portions require replacement.

(ii) The number of service lines requiring replacement must be updated annually to subtract the number of lead status unknown service lines that were discovered to be non-lead and to add the number of non-lead service lines that were discovered to be a lead or galvanized requiring replacement service line.

(iii) Verification of a lead status unknown service line as non-lead in the inventory does not count as a service line replacement.

(8) The service line materials inventory must be publicly accessible.

(i) The inventory must include a location identifier, such as a street address, block, intersection, or landmark, associated with each lead service line and galvanized requiring replacement service line. Water systems may, but are not required to, include a locational identifier for lead status unknown service lines or list the exact address of each service line.

(ii) Water systems serving greater than 50,000 persons must make the publicly accessible inventory available online.

(9) When a water system has no lead, galvanized requiring replacement, or lead status unknown service lines (regardless of ownership) in its inventory, it may comply with the requirements in paragraph (a)(8) of this section using a written statement, in lieu of the inventory, declaring that the distribution system has no lead service lines or galvanized requiring replacement service lines. The statement must include a general description of all applicable sources described in paragraphs (a)(3), (5), and (6) of this section used to make this determination.

(10) Instructions to access the service line inventory (including inventories consisting only of a statement in accordance with paragraph (a)(9) of this section) must be included in Consumer Confidence Report in accordance with § 141.153(d)(4)(xi).

(b) *Lead service line replacement plan.* All water systems with one or more lead, galvanized requiring replacement, or lead status unknown service lines in their distribution system must, by January 16, 2024, submit a lead service line replacement plan to the

State in accordance with § 141.90(e). The lead service line replacement plan must be sufficiently detailed to ensure a system is able to comply with the lead service line replacement requirements in accordance with this section. The plan must include a description of:

(1) A strategy for determining the composition of lead status unknown service lines in its inventory;

(2) A procedure for conducting full lead service line replacement;

(3) A strategy for informing customers before a full or partial lead service line replacement;

(4) For systems that serve more than 10,000 persons, a lead service line replacement goal rate recommended by the system in the event of a lead trigger level exceedance;

(5) A procedure for customers to flush service lines and premise plumbing of particulate lead;

(6) A lead service line replacement prioritization strategy based on factors including but not limited to the targeting of known lead service lines, lead service line replacement for disadvantaged consumers and populations most sensitive to the effects of lead; and

(7) A funding strategy for conducting lead service line replacements which considers ways to accommodate customers that are unable to pay to replace the portion they own.

(c) *Operating procedures for replacing lead goosenecks, pigtails, or connectors.* (1) The water system must replace any lead gooseneck, pigtail, or connector it owns when encountered during planned or unplanned water system infrastructure work.

(2) The water system must offer to replace a customer-owned lead gooseneck, pigtail, or connector; however, the water system is not required to bear the cost of replacement of the customer-owned parts.

(3) The water system is not required to replace a customer-owned lead gooseneck, pigtail, or connector if the customer objects to its replacement.

(4) The replacement of a lead gooseneck, pigtail, or connector does not count for the purposes of meeting the requirements for goal-based or mandatory lead service line replacements, in accordance with paragraphs (f) and (g) of this section, respectively.

(5) Upon replacement of any gooseneck, pigtail, or connector that is attached to a lead service line, the water system must follow risk mitigation procedures specified in § 141.85(f)(2).

(6) The requirements of paragraphs (c)(1), (2), (3), and (5) of this section do not apply if state law includes lead connectors in the definition of lead service lines, prohibits partial lead service line replacements, and requires systems to remove all lead service lines irrespective of a system's 90th percentile lead level.

(d) *Requirements for conducting lead service line replacement that may result in partial replacement.* (1) Any water system that plans to partially replace a lead service line (*e.g.,* replace only the portion of a lead service line that it owns) in coordination with planned infrastructure work must provide notice to the owner of the affected service line, or the owner's authorized agent, as well as non-owner resident(s) served by the affected service line at least 45 days prior to the replacement. The notice must explain that the system will replace the portion of the line it owns and offer to replace the portion of the service line not owned by the water system. The water system is not required to bear the cost of replacement of the portion of the affected service line not owned by the water system.

(i) Before the affected service line is returned to service, the water system must provide notification meeting the content requirements of § 141.85(a) explaining that consumers may experience a temporary increase of lead levels in their drinking water due to the replacement, information about the health effects of lead, and actions consumers can take to minimize their exposure to lead in drinking water. In instances where multi-family dwellings are served by the affected service line to be partially replaced, the water system may elect to post the information at a conspicuous location instead of providing individual notification to all residents.

(ii) The water system must provide information about service line flushing in accordance with the procedure developed in paragraph (b)(5) of this section before the affected service line is returned to service.

(iii) The water system must provide the consumer with a pitcher filter or point-of-use device certified by an American National Standards Institute accredited certifier to reduce lead, six months of replacement cartridges, and instructions for use before the affected service line is returned to service. If the affected service line serves more than one residence or non-residential unit (*e.g.,* a multi-unit building), the water system must provide a filter, six months of replacement cartridges and use instructions to every residence in the building.

(iv) The water system must offer to collect a follow up tap sample between three months and six months after completion of any partial replacement of a lead service line. The water system must provide the results of the sample in accordance with § 141.85(d).

(2) Any water system that replaces the portion of the lead service line it owns due to an emergency repair, must provide notice and risk mitigation measures to the persons served by the affected service line in accordance with paragraphs (d)(1)(i) through (iii) of this section before the affected service line is returned to service.

(3) When a water system is notified by the customer that the customer's portion of the lead service line will be replaced, the water system must make a good faith effort to coordinate simultaneous replacement of its portion of the service line. If simultaneous replacement cannot be conducted, the water system must replace its portion as soon as practicable but no later than 45 days from the date the customer replaces its portion of the lead service line. The water system must provide notification and risk mitigation measure in accordance with paragraphs (d)(1)(i) through (iii) of this section. If the water system fails to replace its portion of the lead service line within 45 days from the date the customer replaces the customer's portion of the lead service line, the water system must notify the State within 30 days of failing to meet the deadline in accordance with § 141.90(e) and complete the replacement no later than 180 days of the date the customer replaces its portion.

(4) When a water system is notified or otherwise learns that replacement of a customer-owned lead service line has occurred within the previous six months and left in place a system-owned lead service line, the water system must replace its portion within 45 days from the day of becoming aware of the customer replacement. The water system must provide notification and risk mitigation measures in accordance with paragraphs (d)(1)(i) through (iii) of this section within 24 hours of becoming aware of the customer replacement. If the water system fails to replace its portion of the affected service line within 45 days of becoming aware of the customer replacement, it must notify the State within 30 days of failing to meet the deadline in accordance with § 141.90(e). The water system must complete the replacement no later than 180 days after the date the customer replaces its portion.

(5) When a water system is notified or otherwise learns of a replacement of a customer-owned lead service line which has occurred more than six months in the past, the water system is not

required to complete the lead service line replacement of the system-owned portion under this paragraph (d)(5), however the system-owned portion must still be included in the calculation of a lead service line replacement rate under paragraph (a)(7) of this section.

(e) *Requirements for conducting full lead service line replacement.* Any water system that conducts a full lead service line replacement must provide notice to the owner of the affected service line, or the owner's authorized agent, as well as non-owner resident(s) served by the affected service line within 24 hours of completion of the replacement. The water system is not required to bear the cost of replacement of the portion of the lead service line not owned by the water system.

(1) The notification must meet the content requirements of § 141.85(a) explaining that consumers may experience a temporary increase of lead levels in their drinking water due to the replacement, information about the health effects of lead, and actions consumers can take to minimize their exposure to lead in drinking water. In instances where multi-family dwellings are served by the lead service line to be replaced, the water system may elect to post the information at a conspicuous location instead of providing individual notification to all residents.

(2) The water system must provide information about service line flushing in accordance with the procedure developed under paragraph (b)(5) of this section before the replaced service line is returned to service.

(3) The water system must provide the consumer with a pitcher filter or point-of-use device certified by an American National Standards Institute accredited certifier to reduce lead, six months of replacement cartridges, and instructions for use before the replaced service line is returned to service. If the lead service line serves more than one residence or non-residential unit (*e.g.,* a multi-unit building), the water system must provide a filter and six months of replacement cartridges and use instructions to every residence in the building.

(4) The water system must offer to the consumer to take a follow up tap sample between three months and six months after completion of any full replacement of a lead service line. The water system must provide the results of the sample to the consumer in accordance with paragraph (d) of this section.

(f) *Goal-based full lead service line replacement for water systems whose 90th percentile lead level is above the trigger level but at or below the lead action level.* Water systems that serve more than 10,000 persons whose 90th percentile lead level from tap samples taken pursuant to § 141.86 is above the lead trigger level but at or below the lead action level must conduct goal-based full lead service line replacement at a rate approved by the state.

(1) The water system must calculate the number of full lead service line replacements it must conduct annually in accordance with paragraph (a)(7) of this section.

(2) Replacement of lead service lines must be conducted in accordance with the requirements of paragraph (d) or (e) of this section.

(3) Only full lead service line replacements count towards a water system's annual replacement goal. Partial lead service line replacements do not count towards the goal.

(4) The water system must provide information to customers with lead, galvanized requiring replacement, or lead status unknown service lines as required in § 141.85(g).

(5) Any water system that fails to meet its lead service line replacement goal must:

(i) Conduct public outreach activities pursuant to § 141.85(h) until either the water system meets its replacement goal, or tap sampling shows the 90th percentile of lead is at or below the trigger level for two consecutive one-year monitoring periods.

(ii) Recommence its goal-based lead service line replacement program pursuant to this paragraph (f)(5)(ii) if the 90th percentile lead level anytime thereafter exceeds the lead trigger level but is at or below the lead action level.

(6) The first year of lead service line replacement shall begin on the first day following the end of the tap sampling period in which the lead trigger level was exceeded. If sampling is required annually or less frequently, the end of the tap sampling monitoring period is September 30 of the calendar year in which the sampling occurs. If the State has established an alternate monitoring period, then the end of the monitoring period will be the last day of that period.

(g) *Mandatory full lead service line replacement for water systems whose 90th percentile lead level exceeds the lead action level.* Water systems serving more than 10,000 persons that exceed the lead action level in tap samples taken pursuant to § 141.86 must conduct mandatory full lead service line replacement at an average annual rate of at least three percent, calculated on a two-year rolling basis.

(1) The average annual number of full lead service line replacements must be calculated in accordance with paragraph (a)(7) of this section.

(2) Lead service line replacement must be conducted in accordance with the requirements of paragraphs (d) and (e) of this section.

(3) Only full lead service line replacement count towards a water system's mandatory replacement rate of at least three percent annually. Partial lead service line replacements do not count towards the mandatory replacement rate.

(4) Water systems must provide information to customers with lead, galvanized requiring replacement, or lead status unknown service lines consistent with § 141.85(g).

(5) Community water systems serving 10,000 or fewer persons and Non-transient non-community water systems for which the state has approved or designated lead service line replacement as a compliance option must conduct lead service line replacement as described in § 141.93(a)(1). Replacement of lead service lines must be conducted in accordance with the requirements of paragraphs (d) and (e) of this section.

(6) A water system may cease mandatory lead service line replacement when it has conducted a cumulative percentage of replacements greater than or equal to 3%, or other percentage specified in paragraph (g)(9) of this section, of the service lines specified in paragraph (a)(7) of this section multiplied by the number of years that elapsed from when the system most recently began mandatory lead service line replacement and the date on which the system's 90th percentile lead level, in accordance with § 141.80(c)(4), has been calculated to be at or below the lead action level during each of four consecutive six-month tap sampling monitoring periods. If tap samples collected in any such system thereafter exceed the lead action level, the system shall recommence mandatory lead service line replacement at the same two-year rolling average rate, unless the State has designated an alternate replacement rate under paragraph (g)(9) of this section.

(7) The water system may also cease mandatory lead service line replacement if the system has no remaining lead status unknown service lines in its inventory and obtains refusals to conduct full lead service line replacement or non-responses from every remaining customer in its distribution system served by either a full or partial lead service line, or a galvanized requiring replacement service line. For purposes of this paragraph (g)(7) and in accordance with § 141.90(e), a water system must provide

documentation to the State of customer refusals including a refusal signed by the customer, documentation of a verbal statement made by the customer refusing replacement, or documentation of no response from the customer after the water system made a minimum of two good faith attempts to reach the customer regarding full lead service line replacement. If the water system's 90th percentile exceeds the lead action level again, it must contact all customers served by a full or partial lead service line or a galvanized requiring replacement service line with an offer to replace the customer-owned portion. Nothing in this paragraph (g)(7) requires the water system to bear the cost of replacement of the customer-owned lead service line.

(8) The first year of lead service line replacement shall begin on the first day following the end of the tap sampling period in which lead action level was exceeded.

(9) The State shall require a system to replace lead service lines on a shorter schedule than that required by this section, taking into account the number of lead service lines in the system, where the State determines a shorter replacement schedule is feasible. The State shall make this determination in writing and notify the system of its finding within six months after the system is required to begin lead service line replacement under paragraph (g) of this section.

(h) *Reporting to demonstrate compliance to State.* To demonstrate compliance with paragraphs (a) through (g) of this section, a system shall report to the State the information specified in § 141.90(e).

■ 9. Amend § 141.85 by:
■ a. Revising the section heading, introductory text, and paragraphs (a)(1) introductory text and (a)(1)(ii);
■ b. Adding paragraph (a)(1)(vii);
■ c. Revising paragraphs (b)(2) introductory text, (b)(2)(ii)(B) introductory text, and (b)(2)(ii)(B)(*1*);
■ c. Adding paragraph (b)(2)(ii)(B)(*7*);
■ d. Removing paragraph (b)(2)(ii)(C);
■ e. Revising paragraphs (b)(2)(vii), (b)(4) introductory text, (b)(4)(iii), (b)(6), and (d)(1), (2), and (4); and
■ f. Adding paragraphs (e) through (j).

The revisions and additions read as follows:

§ 141.85 Public education and supplemental monitoring and mitigation requirements.

All water systems must deliver a consumer notice of lead tap water monitoring results to persons served by the water system at sites that are sampled, as specified in paragraph (d) of this section. A water system with lead, galvanized requiring replacement, or lead status unknown service lines must deliver public education materials to persons with a lead, galvanized requiring replacement, or lead status unknown service line as specified in paragraphs (e) through (g) of this section. All community water systems must conduct annual outreach to local and State health agencies as outlined in paragraph (i) of this section. A community water system serving more than 10,000 persons that fails to meet its annual lead service line replacement goal as required under § 141.84(f) shall conduct outreach activities as specified in paragraph (h) of this section. A water system that exceeds the lead action level based on tap water samples collected in accordance with § 141.86 shall deliver the public education materials contained in paragraph (a) of this section and in accordance with the requirements in paragraph (b) of this section. Water systems that exceed the lead action level shall offer to sample the tap water of any customer who requests it in accordance with paragraph (c) of this section. All small community water systems and non-transient non-community water systems that elect to implement POU devices under § 141.93 must provide public education materials to inform users how to properly use POU devices in accordance with paragraph (j) of this section.

(a) * * *

(1) *Community water systems and non-transient non-community water systems.* Water systems must include the following elements in printed materials (*e.g.,* brochures and pamphlets) in the same order as listed in paragraphs (a)(1)(i) through (vii) of this section. In addition, language in paragraphs (a)(1)(i), (ii), and (vi) of this section must be included in the materials, exactly as written, except for the text in brackets in paragraphs (a)(1)(i), (ii), and (vi) of this section for which the water system must include system-specific information. Any additional information presented by a water system must be consistent with the information in paragraphs (a)(1) through (vii) of this section and be in plain language that can be understood by the general public. Water systems must submit all written public education materials to the State prior to delivery. The State may require the system to obtain approval of the content of written public materials prior to delivery. Water systems may change the mandatory language in paragraphs (a)(1)(i) and (ii) of this section only with State approval.

* * * * *

(ii) *Health effects of lead.* Exposure to lead in drinking water can cause serious health effects in all age groups. Infants and children can have decreases in IQ and attention span. Lead exposure can lead to new learning and behavior problems or exacerbate existing learning and behavior problems. The children of women who are exposed to lead before or during pregnancy can have increased risk of these adverse health effects. Adults can have increased risks of heart disease, high blood pressure, kidney or nervous system problems.

* * * * *

(vii) *Information on lead service lines.* For systems with lead service lines, discuss opportunities to replace lead service lines and explain how to access the service line inventory so the consumer can find out if they have a lead service line. Include information on programs that provide financing solutions to assist property owners with replacement of their portion of a lead service line, and a statement that the water system is required to replace its portion of a lead service line when the property owner notifies them they are replacing their portion of the lead service line.

* * * * *

(b) * * *

(2) A community water system that exceeds the lead action level on the basis of tap water samples collected in accordance with § 141.86, and that is not already conducting public education tasks under this section, must conduct the public education tasks under this section within 60 days after the end of the tap sampling period in which the exceedance occurred:

* * * * *

(ii) * * *

(B) Contact customers who are most at risk by delivering materials that meet the content requirements of paragraph (a) of this section to the following organizations listed in paragraphs (b)(2)(ii)(B)(*1*) through (*7*) of this section that are located within the water system's service area, along with an informational notice that encourages distribution to all the organization's potentially affected customers or community water system's users:

(*1*) Schools, child care facilities, and school boards.

* * * * *

(*7*) Obstetricians-Gynecologists and Midwives.

* * * * *

(vii) For systems that are required to conduct monitoring annually or less

frequently, the end of the tap sampling period is September 30 of the calendar year in which the sampling occurs, or, if the State has established an alternate tap sampling period, the last day of that period.

* * * * *

(4) Within 60 days after the end of the tap sampling period in which the exceedance occurred (unless it already is repeating public education tasks pursuant to paragraph (b)(5) of this section), a non-transient non-community water system shall deliver the public education materials specified by paragraph (a) of this section as follows:

* * * * *

(iii) For systems that are required to conduct monitoring annually or less frequently, the end of the tap sampling period is September 30 of the calendar year in which the sampling occurs, or, if the State has established an alternate tap sampling period, the last day of that period.

* * * * *

(6) A water system may discontinue delivery of public education materials if the system is at or below the lead action level during the most recent six-month tap sampling monitoring period conducted pursuant to § 141.86. Such a system shall recommence public education in accordance with this section if it subsequently exceeds the lead action level during any tap sampling period.

* * * * *

(d) * * *

(1) *Reporting requirement.* All water systems must provide a notice of the individual tap results from lead tap water monitoring carried out under the requirements of § 141.86 to the persons served by the water system at the specific sampling site from which the sample was taken (*e.g.,* the occupants of the building where the tap was sampled).

(2) *Timing of notification.* A water system must provide the consumer notice as soon as practicable but no later than the following timeframes:

(i) For individual samples that do not exceed 15 µg/L of lead, no later than 30 days after the water system learns of the tap monitoring results.

(ii) For individual samples that exceed 15 µg/L of lead, as soon as practicable but no later than 3 calendar days after the water system learns of the tap monitoring results. Water systems that choose to mail the notification must assure those letters are postmarked within three days.

* * * * *

(4) *Delivery.* (i) For lead tap sample results that do not exceed 15 µg/L, the water systems must provide consumer notice to persons served at the tap that was sampled, by mail or by another method approved by the State. For example, upon approval by the State, a non-transient non-community water system could post the results on a bulletin board in the facility to allow users to review the information.

(ii) For lead tap sample results that exceed 15 µg/L, the water systems must provide consumer notice to persons served by the tap that was sampled; such notice must be provided electronically or by phone, hand delivery, by mail, or another method approved by the State.

(e) *Notification of known or potential service line containing lead*—(1) *Notification requirements.* All water systems with lead, galvanized requiring replacement, or lead status unknown service lines in their inventory pursuant to § 141.84(a) must inform all persons served by the water system at the service connection with a lead, galvanized requiring replacement, or lead status unknown service line.

(2) *Timing of notification.* A water system must provide the initial notification within 30 days of completion of the lead service line inventory required under § 141.84 and repeat the notification on an annual basis until the entire service connection is no longer a lead, galvanized requiring replacement, or lead status unknown service line. For new customers, water systems shall also provide the notice at the time of service initiation.

(3) *Content*—(i) *Persons served by a confirmed lead service line.* The notice must include a statement that the person's service line is lead, an explanation of the health effects of lead that meets the requirements of paragraph (a)(1)(ii) of this section, steps persons at the service connection can take to reduce exposure to lead in drinking water, information about opportunities to replace lead service lines as well as programs that provide financing solutions to assist property owners with replacement of their portion of a lead service line, and a statement that the water system is required to replace its portion of a lead service line when the property owner notifies them they are replacing their portion of the lead service line.

(ii) *Persons served by a galvanized requiring replacement service line.* The notice must include a statement that the person's service line is galvanized requiring replacement, an explanation of the health effects of lead, steps persons at the service connection can take to reduce exposure to lead in drinking water, and information about opportunities for replacement of the service line.

(iii) *Persons served by a lead status unknown service line.* The notice must include a statement that the person's service line material is unknown but may be lead, an explanation of the health effects of lead that meets the requirements of paragraph (a)(1)(ii) of this section, steps persons at the service connection can take to reduce exposure to lead in drinking water, and information about opportunities to verify the material of the service line.

(4) *Delivery.* The notice must be provided to persons served by the water system at the service connection with a lead, galvanized requiring replacement, or lead status unknown service line, by mail or by another method approved by the State.

(f) *Notification due to a disturbance to a known or potential service line containing lead.* (1) Water systems that cause disturbance to a lead, galvanized requiring replacement, or lead status unknown service line that results in the water to an individual service line being shut off or bypassed, such as operating a valve on a service line or meter setter, and without conducting a partial or full lead service line replacement, must provide the persons served by the water system at the service connection with information about the potential for elevated lead levels in drinking water as a result of the disturbance as well as instructions for a flushing procedure to remove particulate lead. The water system must comply with the requirements in this paragraph (f)(1) before the affected service line is returned to service.

(2) If the disturbance of a lead, galvanized requiring replacement, or lead status unknown service line results from the replacement of an inline water meter, a water meter setter, or gooseneck, pigtail, or connector, the water system must provide the person served by the water system at the service connection with information about the potential for elevated lead levels in drinking water as a result of the disturbance, public education materials that meet the content requirements in paragraph (a) of this section, a pitcher filter or point-of-use device certified by an American National Standards Institute accredited certifier to reduce lead, instructions to use the filter, and six months of filter replacement cartridges. The water system must comply with the requirements of this paragraph (f)(2) before the affected service line is returned to service.

(3) A water system that conducts a partial or full lead service line replacement must follow procedures in accordance with the requirements in § 141.84(d)(1)(i) through (iv) and (e)(1)(i) through (iv), respectively.

(g) *Information for persons served by known or potential service lines containing lead when a system exceeds the lead trigger level*—(1) *Content.* All water systems with lead service lines that exceed the lead trigger level of 10 µg/L must provide persons served by the water system at the service connection with a lead, galvanized requiring replacement, or lead status unknown service line information regarding the water system's lead service line replacement program and opportunities for replacement of the lead service line.

(2) *Timing.* Waters systems must send notification within 30 days of the end of the tap sampling period in which the trigger level exceedance occurred. Water systems must repeat the notification annually until the results of sampling conducted under § 141.86 are at or below the lead trigger level.

(3) *Delivery.* The notice must be provided to persons served at the service connection with a lead, galvanized requiring replacement, or lead status unknown service line, by mail or by another method approved by the State.

(h) *Outreach activities for failure to meet the lead service line replacement goal.* (1) In the first year after a community water system that serves more than 10,000 persons does not meet its annual lead service line replacement goal as required under § 141.84(f), it must conduct one outreach activity from the following list in the following year until the water system meets its replacement goal or until tap sampling shows that the 90th percentile for lead is at or below the trigger level of 10 µg/L for two consecutive tap sampling monitoring periods:

(i) Send certified mail to customers with a lead or galvanized requiring replacement service line to inform them about the water system's goal-based lead service line replacement program and opportunities for replacement of the service line.

(ii) Conduct a townhall meeting.

(iii) Participate in a community event to provide information about its lead service line replacement program and distribute public education materials that meet the content requirements in paragraph (a) of this section.

(iv) Contact customers by phone, text message, email, or door hanger.

(v) Use another method approved by the State to discuss the lead service line replacement program and opportunities for lead service line replacement.

(2) After the first year following a trigger level exceedance, any water system that thereafter continues to fail to meet its lead service line replacement goal must conduct one activity from paragraph (h)(1) of this section and two additional outreach activities per year from the following list:

(i) Conduct social media campaign.

(ii) Conduct outreach via newspaper, television, or radio.

(iii) Contact organizations representing plumbers and contractors by mail to provide information about lead in drinking water including health effects, sources of lead, and the importance of using lead free plumbing materials.

(iv) Visit targeted customers to discuss the lead service line replacement program and opportunities for replacement.

(3) The water system may cease outreach activities when tap sampling shows that the 90th percentile for lead is at or below the trigger level of 10 µg/L for two consecutive tap sampling monitoring periods or when all customer-side lead or galvanized requiring replacement service line owners refuse to participate in the lead service line replacement program. For purposes of this paragraph (h)(3), a refusal includes a signed statement by the customer refusing lead service line replacement, or documentation by the water system of a verbal refusal or of no response after two good faith attempts to reach the customer.

(i) *Public education to local and State health agencies*—(1) *Find-and-fix results.* All community water systems must provide information to local and State health agencies about find-and-fix activities conducted in accordance with § 141.82(j) including the location of the tap sample site that exceeded 15 µg/L, the result of the initial tap sample, the result of the follow up tap sample, the result of water quality parameter monitoring, and any distribution system management actions or corrosion control treatment adjustments made.

(2) *Timing and content.* Community water systems must annually send copies of the public education materials provided under paragraph (a) of this section, and of paragraph (h)(1) of this section for actions conducted in the previous calendar year no later than July 1 of the following year.

(3) *Delivery.* Community water systems shall send public education materials and find-and-fix information to local and State health agencies by mail or by another method approved by the State.

(j) *Public education requirements for small water system compliance flexibility POU devices*—(1) *Content.* All small community water systems and non-transient non-community water systems that elect to implement POU devices under § 141.93 must provide public education materials to inform users how to properly use POU devices to maximize the units' effectiveness in reducing lead levels in drinking water.

(2) *Timing.* Water systems shall provide the public education materials at the time of POU device delivery.

(3) *Delivery.* Water systems shall provide the public education materials in person, by mail, or by another method approved by the State, to persons at locations where the system has delivered POU devices.

■ 10. Amend § 141.86 by revising paragraphs (a), (b), (d), (e), (f) introductory text, and (g) introductory text and adding paragraphs (h) and (i) to read as follows:

§ 141.86 Monitoring requirements for lead and copper in tap water.

(a) *Sample site location.* (1) By the applicable date for commencement of monitoring under paragraph (d)(1) of this section, each water system shall identify a pool of targeted sampling sites based on the service line inventory conducted in accordance with § 141.84(a), that meet the requirements of this section, and which is sufficiently large enough to ensure that the water system can collect the number of lead and copper tap samples required in paragraph (c) of this section. Sampling sites may not include sites with installed point-of-entry (POE) treatment devices and taps used at sampling sites may not have point-of-use (POU) devices designed to remove inorganic contaminants, except for water systems monitoring under § 141.93(a)(3)(iv) and water systems using these devices for the primary drinking water tap to meet other primary and secondary drinking water standards and all service connections have POEs or POUs to provide localized treatment for compliance with the other drinking water standards. Lead and copper sampling results for systems monitoring under § 141.93(a)(3)(iv) may not be used for the purposes of meeting the criteria for reduced monitoring specified in paragraph (d)(4) of this section.

(2) A water system must use the information on lead, copper, and galvanized iron or steel that is required to be identified under § 141.42(d) when conducting a materials evaluation and the information on lead service lines that is required to be collected under

§ 141.84(a) to identify potential lead service line sampling sites.

(3) The sampling sites for a community water system's sampling pool must consist of single-family structures that are served by a lead service line (''Tier 1 sampling sites''). When multiple-family residences comprise at least 20 percent of the structures served by the water system, the system may include these types of structures in its Tier 1 sampling pool, if served by a lead service line. Sites with lead status unknown service lines must not be used as Tier 1 sampling sites.

(4) A community water system with insufficient Tier 1 sampling sites must complete its sampling pool with ''Tier 2 sampling sites,'' consisting of buildings, including multiple-family residences that are served by a lead service line. Sites with lead status unknown service lines must not be used as Tier 2 sampling sites.

(5) A community water system with insufficient Tier 1 and Tier 2 sampling sites must complete its sampling pool with ''Tier 3 sampling sites,'' consisting of single-family structures that contain galvanized lines identified as being downstream of a lead service line (LSL) currently or in the past, or known to be downstream of a lead gooseneck, pigtail or connector. Sites with lead status unknown service lines must not be used as Tier 3 sampling sites.

(6) A community water system with insufficient Tier 1, Tier 2, and Tier 3 sampling sites must complete its sampling pool with ''Tier 4 sampling sites,'' consisting of single-family structures that contain copper pipes with lead solder installed before the effective date of the State's applicable lead ban. Sites with lead status unknown service lines must not be used as Tier 4 sampling sites.

(7) A community water system with insufficient Tier 1, Tier 2, Tier 3, and Tier 4 sampling sites must complete its sampling pool with ''Tier 5 sampling sites,'' consisting of single-family structures or buildings, including multiple family residences that are representative of sites throughout the distribution system. For the purpose of this paragraph (a)(7), a representative site is a site in which the plumbing materials used at that site would be commonly found at other sites served by the water system. Water systems may use non-residential buildings that are representative of sites throughout the distribution system if and only if there are an insufficient number of single-family or multiple family residential Tier 5 sites available.

(8) The sampling sites selected for a non-transient non-community water system must consist of sites that are served by a lead service line (''Tier 1 sampling sites''). Sites with lead status unknown service lines must not be used as Tier 1 sampling sites.

(9) A non-transient non-community water system with insufficient Tier 1 sites complete its sampling pool with ''Tier 3 sampling sites,'' consisting of sampling sites that contain galvanized lines identified as being downstream of an LSL currently or in the past, or known to be downstream of a lead gooseneck, pigtail, or connector. Sites with lead status unknown service lines must not be used as Tier 3 sampling sites.

(10) A non-transient non-community water system with insufficient Tier 1 and Tier 3 sampling sites must complete its sampling pool with ''Tier 5 sampling sites,'' consisting of sampling sites that are representative of sites throughout the distribution system. For the purpose of this paragraph (a)(10), a representative site is a site in which the plumbing materials used at that site would be commonly found at other sites served by the water system.

(11) A water system whose distribution system contains lead service lines must collect all samples for monitoring under this section from sites served by a lead service line. A water system that cannot identify a sufficient number of sampling sites served by lead service lines must still collect samples from every site served by a lead service line, and collect the remaining samples in accordance with tiering requirements under paragraphs (a)(5) through (7) or paragraphs (a)(9) through (10) of this section.

(b) *Sample collection methods.* (1) All tap samples for lead and copper collected in accordance with this subpart, with the exception of fifth liter samples collected under paragraph (b)(3) of this section, and samples collected under paragraphs (b)(5) and (h) of this section, must be first draw samples. The first draw sample shall be analyzed for lead and copper in tap sampling periods where both contaminants are required to be monitored. In tap sampling periods where only lead is required to be monitored, the first draw sample may be analyzed for lead only.

(2) Each first draw tap sample for lead and copper must be one liter in volume and have stood motionless in the plumbing system of each sampling site for at least six hours. Bottles used to collect first draw samples must be wide-mouth one-liter sample bottles. First draw samples from residential housing must be collected from the cold-water kitchen or bathroom sink tap. First draw samples from a nonresidential building must be one liter in volume and collected at a tap from which water is typically drawn for consumption. State-approved non-first-draw samples collected in lieu of first draw samples pursuant to paragraph (b)(5) of this section must be one liter in volume and shall be collected at an interior tap from which water is typically drawn for First draw samples may be collected by the system or the system may allow residents to collect first draw samples after instructing the residents of the sampling procedures specified in this paragraph (b)(2). Sampling instructions provided to residents must not include instructions for aerator removal and cleaning or flushing of taps prior to the start of the minimum six-hour stagnation period. To avoid problems of residents handling nitric acid, acidification of first draw samples may be done up to 14 days after the sample is collected. After acidification to resolubilize the metals, the sample must stand in the original container for the time specified in the approved EPA method before the sample can be analyzed. If a system allows residents to perform sampling, the system may not challenge, based on alleged errors in sample collection, the accuracy of sampling results.

(3)(i) All tap samples for copper collected in at sites with a lead service line shall be the first draw sample collected using the procedure listed in this paragraph (b)(3). Tap samples for copper are required to be collected and analyzed only in monitoring periods for which copper monitoring is required.

(ii) Systems must collect tap water in five consecutively numbered one-liter sample bottles after the water has stood motionless in the plumbing of each sampling site for at least six hours without flushing the tap prior to sample collection. Systems must analyze first draw samples for copper, when applicable, and fifth liter samples for lead. Bottles used to collect these samples must be wide-mouth one-liter sample bottles. Systems must collect first draw samples in the first sample bottle with each subsequently numbered bottle being filled until the final bottle is filled with the water running constantly during sample collection. Fifth liter sample is the final sample collected in this sequence. System must collect first draw and fifth liter samples from residential housing from the cold-water kitchen or bathroom sink tap First draw and fifth liter samples from a nonresidential building must be one liter in volume and collected at an interior cold water tap from which water is typically drawn for

consumption. First draw and fifth liter samples may be collected by the system or the system may allow residents to collect first draw samples and fifth liter samples after instructing the residents on the sampling procedures specified in this paragraph (b)(3)(ii). Sampling instructions provided to customers must not direct the customer to remove the aerator or clean or flush the taps prior to the start of the minimum six-hour stagnation period. To avoid problems of residents handling nitric acid, the system may acidify first draw samples up to 14 days after the sample is collected. After acidification to resolubilize the metals, the sample must stand in the original container for the time specified in the approved EPA method before the sample can be analyzed. If a system allows residents to perform sampling, the system may not challenge, based on alleged errors in sample collection, the accuracy of sampling results.

(4) A water system must collect each first draw tap sample from the same sampling site from which it collected the previous sample. A water system must collect each fifth liter sample from the same sampling site from which it collected the previous sample. If, for reasons beyond the control of the water system, the water system cannot gain entry to a sampling site in order to collect a follow-up tap sample, the system may collect the follow-up tap sample from another sampling site in its sampling pool as long as the new site meets the same targeting criteria, and is within reasonable proximity of the original site.

(5) A non-transient, non-community water system, or a community water system that meets the criteria of § 141.85(b)(7), that does not have enough taps that can supply first draw samples or fifth liter samples meeting the six-hour minimum stagnation time, as defined in § 141.2, may apply to the State in writing to substitute non-first draw, first-draw, or fifth liter samples that do not meet the six-hour minimum stagnation time. Such systems must collect as many first draw or fifth liter samples from interior taps typically used for consumption, as possible and must identify sampling times and locations that would likely result in the longest standing time for the remaining sites. The State has the discretion to waive the requirement for prior State approval of sites not meeting the six-hour stagnation time either through State regulation or written notification to the system.

* * * * *

(d) *Timing of monitoring*—(1) *Standard monitoring.* Standard monitoring is a six-month tap sampling monitoring period that begins on January 1 or July 1 of the year in which the water system is monitoring at the standard number of sites in accordance to paragraph (c) of this section.

(i) All water systems with lead service lines, including those deemed optimized under § 141.81(b)(3), and systems that did not conduct monitoring that meets all requirements of this section (*e.g.,* sites selected in accordance with paragraph (a) of this section, samples collected in accordance with paragraph (b) of this section, etc.) between January 15, 2021 and January 16, 2024, must begin the first standard monitoring period on January 1 or July 1 in the year following the January 16, 2024, whichever is sooner. Upon completion of this monitoring, systems must monitor in accordance with paragraph (d)(1)(ii) of this section.

(ii) Systems that conducted monitoring that meets all requirements of this section (*e.g.,* sites selected in accordance with paragraph (a) of this section, samples collected in accordance with paragraph (b) of this section, etc.) between January 15, 2021 and January 16, 2024, and systems that have completed monitoring under paragraph (d)(1)(i) of this section, must continue monitoring as follows:

(A) Systems that do not meet the criteria under paragraph (d)(4) of the section must conduct standard monitoring.

(B) Systems that meet the criteria under paragraph (d)(4) of this section must continue to monitor in accordance with the criteria in paragraph (d)(4).

(C) Any system monitoring at a reduced frequency in accordance with paragraph (d)(4) of this section that exceeds an action level must resume standard monitoring beginning January 1 of the calendar year following the tap sampling monitoring period in which the system exceeded the action level. Any such system must also monitor in accordance with § 141.87(b), (c), or (d) as applicable.

(D) Any system monitoring at a reduced frequency that exceeds the lead trigger level but meets the copper action level must not monitor any less frequently than annually and must collect samples from the standard number of sites as established in paragraph (c) of this section. This monitoring must begin the calendar year following the tap sampling monitoring period in which the system exceeded the action level. Any such system must also monitor in accordance with § 141.87(b), (c), or (d) as applicable.

(E) Any system that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the State under § 141.82(f) for more than nine days in any monitoring period specified in § 141.87 must conduct standard tap water monitoring and must resume sampling for water quality parameters in accordance with § 141.87(d). This standard monitoring must begin no later than the 6-month period beginning January 1 of the calendar year following the water quality parameter excursion.

(F) Any water system that becomes a *large water system* without corrosion control treatment or any large water system without corrosion control treatment whose lead 90th percentile exceeds the lead practical quantitation level must conduct standard monitoring for at least two consecutive 6-month tap sampling monitoring periods and then must continue monitoring in accordance with this paragraph (d)(1)(ii)(F).

(2) *Monitoring after installation of initial or re-optimized corrosion control treatment, installation of source water treatment and addition of new source or change in treatment.* (i) Any water system that installs or re-optimizes corrosion control treatment, as a result of exceeding the lead or copper action level, must monitor for lead and copper every six months and comply with previously designated water quality parameter values, where applicable, until the State specifies new water quality parameter values for optimal corrosion control.

(ii) Any water system that re-optimizes corrosion control treatment as a result of exceeding the lead trigger level but has not exceeded the lead or copper action level must monitor annually for lead at the standard number of sites listed in paragraph (c) of this section. Samples shall be analyzed for copper on a triennial basis. Small and medium-size systems that do not exceed the lead trigger level in three annual monitoring periods may reduce lead monitoring in accordance with paragraph (d)(4) of this section.

(iii) Any water system that installs source water treatment pursuant to § 141.83(a)(3) must monitor every six months until the system at or below lead and copper action levels for two consecutive six-month monitoring periods. Systems that do not exceed the lead or copper action level for two consecutive 6-month monitoring periods may reduce monitoring in accordance with paragraph (d)(4) of this section.

(iv) If a water system has notified the State in writing in accordance with § 141.90(a)(3) of an upcoming addition

of a new source or long term change in treatment, the water system shall monitor every six months at the standard number of sites listed under paragraph (c) of this section until the system is at or below the lead and copper action levels for two consecutive six-month monitoring periods, unless the State determines that the addition of the new source or long term change in treatment is not significant and, therefore, does not warrant more frequent monitoring. Systems that do not exceed the lead and copper action levels, and/or the lead trigger level for two consecutive six-month monitoring periods may reduce monitoring in accordance with paragraph (d)(4) of this section.

(3) *Monitoring after State specifies water quality parameter values for optimal corrosion control treatment.* (i) After the State specifies the values for water quality control parameters under § 141.82(f), the system must conduct standard six-month monitoring for two consecutive six-month tap sampling monitoring periods. Systems may then reduce monitoring in accordance with paragraph (d)(4) of this section as applicable, following a State determination that reduced monitoring is approved.

(ii) Systems required to complete the re-optimization steps in § 141.81(d) due to the exceedance of the lead trigger level that do not exceed the lead and copper action levels must monitor for two consecutive 6-month tap sampling monitoring periods. Systems may then reduce monitoring in accordance with paragraph (d)(4) of this section as applicable following a State determination that reduced monitoring is approved.

(4) *Reduced monitoring based on 90th percentile levels.* Reduced monitoring refers to an annual or triennial tap sampling monitoring period. The reduced monitoring frequency is based on the 90th percentile value for the water system.

(i) A water system that meets the criteria for reduced monitoring under paragraph (d)(4) of this section must collect these samples from sampling sites identified in paragraph (a) of this section. Systems monitoring annually or less frequently must conduct the lead and copper tap sampling during the months of June, July, August, or September unless the State has approved a different sampling period in accordance with paragraph (d)(4)(i)(A) of this section.

(A) The State at its discretion may approve a different tap sampling period for conducting the lead and copper tap sampling for systems collecting samples at a reduced frequency. Such a period must be no longer than four consecutive months, within one calendar year, and must represent a time of normal operation where the highest levels of lead are most likely to occur. For a non-transient non-community water system that does not operate during the months of June through September and for which the period of normal operation where the highest levels of lead are most likely to occur is not known, the State must designate a period that represents normal operation for the system. This monitoring must begin during the period approved or designated by the State in the calendar year immediately following the end of the second 6-month monitoring period for systems initiating annual monitoring and during the 3-year period following the end of the third consecutive year of annual monitoring for systems initiating triennial monitoring.

(B) Systems monitoring annually that have been collecting samples during the months of June through September and that receive State approval to alter their tap sampling monitoring period under paragraph (d)(4)(i)(A) of this section must collect their next round of samples during a time period that ends no later than 21 months after the previous round of sampling. Systems monitoring triennially that have been collecting samples during the month of June through September and receive State approval to alter their sampling collection period as per paragraph (d)(4)(i)(A) of this section must collect their next round of samples during a time period that ends no later than 45 months after the previous tap sampling period. Subsequent monitoring must be conducted annually or triennially, as required by this section.

(C) Small systems with waivers granted pursuant to paragraph (g) of this section that have been collecting samples during the months of June through September and receive State approval to alter their tap sampling period as per paragraph (d)(4)(i)(A) of this section must collect their next round of samples before the end of the 9-year period.

(ii) Any system that meets the lead trigger level and the copper action levels during two consecutive 6-month tap sampling monitoring periods may reduce the monitoring frequency to annual monitoring and must sample at the standard number of sampling sites for lead and the reduced number of sites for copper as specified in paragraph (c) of this section. Systems operating *OCCT* must also have maintained the range of OWQPs set by the State in accordance with § 141.82(f) for the same period and receive a written determination from the State approving annual monitoring based on the State's review of monitoring, treatment, and other relevant information submitted by the system as required by § 141.90. This sampling must begin no later than the calendar year immediately following the last calendar year in which the system sampled.

(iii) Any water system that exceeds the lead trigger level but not the lead and copper action levels during two consecutive 6-month tap sampling monitoring periods must monitor no less frequently than annually at the standard number of sampling sites for lead and copper specified in paragraph (c) of this section. Systems operating OCCT must also have maintained the range of OWQPs set by the State in accordance with § 141.82(f) for the same period of 6-month monitoring and receive a written determination from the State approving annual monitoring based on the State's review of monitoring, treatment, and other relevant information submitted by the system as required by § 141.90. This sampling must begin no later than the calendar year immediately following the last calendar year in which the system sampled.

(iv) Any water system that exceeds the lead trigger level but not the lead and copper action levels during three consecutive years of monitoring may reduce the tap sampling monitoring period for copper to once every three years; however, the system may not reduce the tap sampling monitoring period for lead. Systems operating OCCT must also maintain the range of OWQPs set by the State in accordance with § 141.82(f) and receive a written determination from the State approving triennial monitoring based on the State's review of monitoring, treatment, and other relevant information submitted by the system as required by § 141.90. This sampling must begin no later than the third calendar year immediately following the last calendar year in which the system sampled.

(v) Any small or medium-sized system that does not exceed the lead trigger level and the copper action level during three consecutive years of monitoring (standard monitoring completed during both six-month periods of a calendar year shall be considered 1 year of monitoring) may sample at the reduced number of sites for lead and copper in accordance with paragraph (c) of this section and reduce the monitoring frequency to triennial monitoring. Systems operating OCCT must also have maintained the range of OWQPs set by the State in accordance

with § 141.82(f) for the same three-year period and receive a written determination from the State approving triennial monitoring based on the State's review of monitoring, treatment, and other relevant information submitted by the system as required by § 141.90. This sampling must begin no later than three calendar years after the last calendar year in which the system sampled.

(vi) Any water system that demonstrates for two consecutive 6-month monitoring periods that its 90th percentile lead level, calculated under § 141.80(c)(4), is less than or equal to 0.005 mg/L and the 90th percentile copper level, calculated under § 141.80(c)(4), is less than or equal to 0.65 mg/L may sample at the reduced number of sites for lead and copper in accordance with paragraph (c) of this section and reduce the frequency of monitoring to triennial monitoring. For water systems with corrosion control treatment, the system must maintain the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the State under § 141.82(f) to qualify for reduced monitoring pursuant to this paragraph (d)(4)(vi).

(e) *Additional monitoring by systems.* The results of any monitoring conducted in addition to the minimum requirements of this section (such as customer-requested sampling) shall be considered by the water system and the State in making any determinations (*i.e.,* calculating the 90th percentile lead or copper level) under this subpart. Lead service line water systems that are unable to collect the minimum number of samples from Tier 1 or Tier 2 sites shall calculate the 90th percentile using data from all the lead service lines sites and the highest lead and copper values from lower tier sites to meet the specified minimum number of samples. Systems must submit data from additional tier 3, 4 or 5 sites to the State but may not use these results in the 90th percentile calculation. Water systems must include customer-requested samples from known lead service line sites in the 90th percentile calculation if the samples meet the requirements of this section.

(f) *Invalidation of lead and copper tap samples used in the calculation of the 90th percentile.* A sample invalidated under this paragraph (f) does not count toward determining lead or copper 90th percentile levels under § 141.80(c)(4) or toward meeting the minimum monitoring requirements of paragraph (c) of this section.

* * * * *

(g) *Monitoring waivers for systems serving 3,300 or fewer persons.* Any water system serving 3,300 or fewer persons that meets the criteria of this paragraph (g) may apply to the State to reduce the frequency of monitoring for lead and copper under this section to once every nine years (*i.e.,* a ''full waiver'') if it meets all of the materials criteria specified in paragraph (g)(1) of this section and all of the monitoring criteria specified in paragraph (g)(2) of this section. If State regulations permit, any water system serving 3,300 or fewer persons that meets the criteria in paragraphs (g)(1) and (2) of this section only for lead, or only for copper, may apply to the State for a waiver to reduce the frequency of tap water monitoring to once every nine years for that contaminant only (*i.e.,* a ''partial waiver'').

* * * * *

(h) *Follow-up samples for ''find-and-fix'' under § 141.82(j).* Systems shall collect a follow-up sample at any site that exceeds the action level within 30 days of receiving the sample results. These follow-up samples may use different sample volumes or different sample collection procedures to assess the source of elevated lead. Systems shall submit samples collected under this section to the State but shall not include such samples in the 90th percentile calculation.

(i) *Public availability of tap monitoring results used in the 90th percentile calculation.* All water systems must make available to the public the results of compliance tap water monitoring data, including data used in the 90th percentile calculation under § 141.80(c)(4), within 60 days of the end of the applicable tap sampling period. Nothing in this section requires water systems to make publicly available the addresses of the sites where the tap samples were collected. Large systems shall make available the monitoring results in a digital format. Small and medium-size systems shall make available the monitoring results in either a written or digital format. Water systems shall retain tap sampling monitoring data in accordance to recordkeeping requirements under § 141.91.

■ 11. Revise § 141.87 to read as follows:

§ 141.87 Monitoring requirements for water quality parameters.

All large water systems, and all small- and medium-size water systems that exceed the lead or copper action level, and all small- and medium-size water systems with corrosion control treatment that exceed the lead trigger level must monitor water quality parameters in addition to lead and copper in accordance with this section.

(a) *General requirements*—(1) *Sample collection methods.* (i) Tap samples must be representative of water quality throughout the distribution system, taking into account the number of persons served, the different sources of water, the different treatment methods employed by the system, and seasonal variability. Tap sampling under this section is not required to be conducted at taps targeted for lead and copper sampling under § 141.86(a). Sites selected for tap samples under this section must be included in the site sample plan specified under § 141.86(a)(1). The site sample plan must be updated prior to changes to the sampling locations. [Note: Systems may find it convenient to conduct tap sampling for water quality parameters at sites used for total coliform sampling under § 141.21(a)(1) if they also meet the requirements of this section.]

(ii) Samples collected at the entry point(s) to the distribution system must be from locations representative of each source after treatment. If a system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (*i.e.,* when water is representative of all sources being used).

(2) *Number of samples.* (i) Systems must collect two tap samples for applicable water quality parameters during each monitoring period specified under paragraphs (b) through (e) of this section from the minimum number of sites listed in table 1 to this paragraph (a)(2)(i). Systems that add sites as a result of the ''find-and-fix'' requirements in § 141.82(j) must collect tap samples for applicable water quality parameters during each monitoring period under paragraphs (b) through (e) of this section and must sample from that adjusted minimum number of sites. Systems are not required to add sites if they are monitoring at least twice the minimum number of sites list in table 1 to this paragraph (a)(2)(i).

TABLE 1 TO PARAGRAPH (a)(2)(i)

System size (number people served)	Minimum number of sites for water quality parameters
>100,000	25
10,001–100,000	10
3,301–10,000	3
501–3,300	2
101–500	1
≤ 100	1

(ii)(A) Except as provided in paragraph (c)(2) of this section, water systems without corrosion control treatment must collect two samples for each applicable water quality parameter at each entry point to the distribution system during each monitoring period specified in paragraph (b) of this section. During each monitoring period specified in paragraphs (c) through (e) of this section, water systems must collect one sample for each applicable water quality parameter at each entry point to the distribution system.

(B) During each monitoring period specified in paragraphs (c) through (e) of the section, water systems with corrosion control treatment must continue to collect one sample for each applicable water quality parameter at each entry point to the distribution system no less frequently than once every two weeks.

(b) *Initial sampling for water systems.* Any large water system without corrosion control treatment must monitor for water quality parameters as specified in paragraphs (b)(1) and (2) of this section during the first two six-month tap sampling monitoring periods beginning no later than January 1 of the calendar year after the system either becomes a large water system, or fails to maintain their 90th percentile for lead below the PQL for lead. Any medium or small system that exceeds the lead or copper action level and any system with corrosion control treatment for which the State has not designated OWQPs that exceeds the lead trigger level shall monitor for water quality parameters as specified in paragraphs (b)(1) and (2) of this section for two consecutive 6-month periods beginning the month immediately following the end of the tap sampling period in which the exceedance occurred.

(1) At taps, two samples for:

(i) pH;

(ii) Alkalinity;

(2) At each entry point to the distribution system all of the applicable parameters listed in paragraph (b)(1) of this section.

(c) *Monitoring after installation of optimal corrosion control or re-optimized corrosion control treatment.* (1) Any system that installs or modifies corrosion control treatment pursuant to § 141.81(d)(5) or (e)(5) and is required to monitor pursuant § 141.81(d)(6) or (e)(6) must monitor the parameters identified in paragraphs (c)(1)(i) and (ii) of this section every six months at the locations and frequencies specified in paragraphs (c)(1)(i) and (ii) of this section until the State specifies new water quality parameter values for optimal corrosion control pursuant to paragraph (d) of this section. Water systems must collect these samples evenly throughout the 6-month monitoring period so as to reflect seasonal variability.

(i) At taps, two samples each for:

(A) pH;

(B) Alkalinity;

(C) Orthophosphate, when an inhibitor containing an orthophosphate compound is used;

(D) Silica, when an inhibitor containing a silicate compound is used.

(ii) Except as provided in paragraph (c)(1)(iii) of this section, at each entry point to the distribution system, at least one sample no less frequently than every two weeks (biweekly) for:

(A) pH;

(B) When alkalinity is adjusted as part of optimal corrosion control, a reading of the dosage rate of the chemical used to adjust alkalinity, and the alkalinity concentration; and

(C) When a corrosion inhibitor is used as part of optimal corrosion control, a reading of the dosage rate of the inhibitor used, and the concentration of orthophosphate or silica (whichever is applicable).

(iii) Any groundwater system can limit entry point sampling described in paragraph (c)(1)(ii) of this section to those entry points that are representative of water quality and treatment conditions throughout the system. If water from untreated groundwater sources mixes with water from treated groundwater sources, the system must monitor for water quality parameters both at representative entry points receiving treatment and representative entry points receiving no treatment. Prior to the start of any monitoring under this paragraph (c)(1)(iii), the water system must provide to the State, written information identifying the selected entry points and documentation, including information on seasonal variability, sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

(2) States have the discretion to require small and medium-size systems with treatment for which the State has not designated OWQPs that exceed the lead trigger level but not the lead and copper action levels to conduct water quality parameter monitoring as described in paragraph (c)(1) of this section or the State can develop its own water quality control parameter monitoring structure for these systems.

(d) *Monitoring after State specifies water quality parameter values for optimal corrosion control.* (1) After the State specifies the values for applicable water quality parameters reflecting optimal corrosion control treatment under § 141.82(f), systems must monitor for the specified optimal water quality parameters during 6-month periods that begin on either January 1 or July 1. Such monitoring must be spaced evenly throughout the 6-month monitoring period so as to reflect seasonal variability and be consistent with the structure specified in paragraphs (c)(1)(i) through (iii) of this section.

(i) All large systems must measure the applicable water quality parameters specified by the State and determine compliance with the requirements of § 141.82(g) every six months with the first 6-month period to begin on either January 1 or July 1, whichever comes first, after the State specifies the optimal values under § 141.82(f).

(ii) Any small or medium-size water system that exceeds an action level must begin monitoring during the six-month period immediately following the tap sampling monitoring period in which the exceedance occurs and continue monitoring until the water system no longer exceeds the lead and copper action levels and meets the optimal water quality control parameters in two consecutive 6-month tap sampling monitoring periods under § 141.86(d)(3). For any such small and medium-size system that is subject to a reduced monitoring frequency pursuant to § 141.86(d)(4) at the time of the action level exceedance, the start of the applicable 6-month monitoring period under this paragraph must coincide with the start of the applicable tap sampling monitoring period under § 141.86(d)(4).

(iii) Compliance with State-designated optimal water quality parameter values must be determined as specified under § 141.82(g).

(2) Any small or medium-size system that exceeds the lead trigger level, but not the lead and copper action levels for which the State has set optimal water quality control parameters must monitor as specified in paragraph (d)(1) of this section every six month, until the system no longer exceeds the lead trigger level in two consecutive tap sampling monitoring periods.

(3) States have the discretion to continue to require systems described in paragraph (d)(2) of this section to monitor optimal water quality control parameters.

(e) *Reduced monitoring.* (1) Any large water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the State under § 141.82(f) and does not exceed the lead trigger level during each of two consecutive 6-month monitoring

periods under paragraph (d) of this section must continue monitoring at the entry point(s) to the distribution system as specified in paragraph (c)(1)(ii) of this section. Such system may collect two tap samples for applicable water quality parameters from the following reduced number of sites during each 6-month monitoring period. Water systems must collect these samples evenly throughout the 6-month monitoring period so as to reflect seasonal variability.

TABLE 2 TO PARAGRAPH (e)(1)

System size (number of people served)	Reduced minimum number of sites for water quality parameters
>100,000	10
10,001–100,000	7
3,301–10,000	3
501–3,300	2
101–500	1
≤100	1

(2)(i) Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the State under § 141.82(f) and does not exceed the lead trigger level or copper action level during three consecutive years of monitoring may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in paragraph (e)(1) of this section, from every six months to annually. This sampling begins during the calendar year immediately following the end of the monitoring period in which the third consecutive year of 6-month monitoring occurs.

(ii) A water system may reduce the frequency with which it collects tap samples for applicable water quality parameters specified in paragraph (e)(1) of this section to every year if it demonstrates during two consecutive monitoring periods that its tap water lead level at the 90th percentile is less than or equal to the PQL for lead of 0.005 mg/L that its tap water copper level at the 90th percentile is less than or equal to 0.65 mg/L in § 141.80(c)(3), and that it also has maintained the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the State under § 141.82(f).

(3) A water system that conducts sampling annually must collect these samples evenly throughout the year so as to reflect seasonal variability.

(4) Any water system subject to the reduced monitoring frequency that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the State in § 141.82(f) for more than nine days in any 6-month period specified in § 141.82(g) must resume distribution system tap water sampling in accordance with the number and frequency requirements in paragraph (d) of this section. Such a system may resume annual monitoring for water quality parameters at the tap at the reduced number of sites specified in paragraph (e)(1) of this section after it has completed two subsequent consecutive 6-month rounds of monitoring that meet the criteria of paragraph (e)(1) of this section and/or may resume annual monitoring for water quality parameters at the tap at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either paragraph (e)(2)(i) or (ii) of this section.

(f) *Additional monitoring by systems.* The results of any monitoring conducted in addition to the minimum requirements of this section must be considered by the water system and the State in making any determinations (*i.e.,* determining concentrations of water quality parameters) under this section or § 141.82.

(g) *Additional sites added from find-and-fix.* Any water system that conducts water quality parameter monitoring at additional sites through the ''find-and-fix'' provisions pursuant to § 141.82(j) must add those sites to the minimum number of sites specified under paragraphs (a) through (e) of this section unless the system is monitoring at least twice the minimum number of sites.

■ 12. Amend § 141.88 by:

■ a. Revising paragraphs (a)(1)(i), (b), (c), (d) heading, (d)(1) introductory text, (e)(1) introductory text, and (e)(1)(i);

■ b. Removing and reserving paragraph (e)(1)(ii);

■ c. Revising paragraph (e)(2) introductory text;

■ d. Removing ''; or'' at the end of paragraph (e)(2)(i) and adding a period in its place; and

■ e. Removing and reserving paragraph (e)(2)(ii).

The revisions read as follows:

§ 141.88 Monitoring requirements for lead and copper in source water.

(a) * * *

(1) * * *

(i) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after treatment (hereafter called a sampling point). The system shall take one sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

* * * * *

(b) *Monitoring frequency after system exceeds tap water action level.* Any system which exceeds the lead or copper action level at the tap for the first time or for the first time after an addition of a new source or installation of source water treatment required under § 141.83(b)(2) shall collect one source water sample from each entry point to the distribution system no later than six months after the end of the tap sampling period during which the lead or copper action level was exceeded. For tap sampling periods that are annual or less frequent, the end of the tap sampling period is September 30 of the calendar year in which the sampling occurs, or if the State has established an alternate monitoring period, the last day of that period. If the State determines that source water treatment is not required under § 141.83(b)(2), the state may waive source water monitoring, for any subsequent lead or copper action level exceedance at the tap, in accordance with the requirements in paragraphs (b)(1)(i) through (iii) of this section.

(1) The State may waive source water monitoring for lead or copper action level exceedance at the tap under the following conditions:

(i) The water system has already conducted source water monitoring following a previous action level exceedance;

(ii) The State has determined that source water treatment is not required; and

(iii) The system has not added any new water sources.

(2) [Reserved]

(c) *Monitoring frequency after installation of source water treatment and addition of new source.* (1) Any system which installs source water treatment pursuant to § 141.83(a)(3) shall collect one source water sample from each entry point to the distribution system during two consecutive six-month monitoring periods by the deadline specified in § 141.83(a)(4).

(2) Any system which adds a new source shall collect one source water sample from each entry point to the distribution system until the system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the State in § 141.83(b)(4) or the State determines that source water treatment is not needed.

(d) *Monitoring frequency after State specifies maximum permissible source water levels.* (1) A system shall monitor at the frequency specified in paragraphs (d)(1) and (2) of this section, in cases where the State specifies maximum permissible source water levels under § 141.83(b)(4).

* * * * *

(e) * * *

(1) A water system using only groundwater may reduce the monitoring frequency for lead and copper in source water to once during each nine-year compliance cycle (as that term is defined in § 141.2) provided that the samples are collected no later than every ninth calendar year and if the system meets the following criteria:

(i) The system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the State in § 141.83(b)(4) during at least three consecutive monitoring periods under paragraph (d)(1) of this section.

* * * * *

(2) A water system using surface water (or a combination of surface water and groundwater) may reduce the monitoring frequency in paragraph (d)(1) of this section to once during each nine-year compliance cycle (as that term is defined in § 141.2) provided that the samples are collected no later than every ninth calendar year and if the system meets the following criteria:

* * * * *

■ 13. Amend § 141.89 by revising paragraphs (a) introductory text, (a)(1) introductory text, and (a)(1)(iii) to read as follows:

§ 141.89 Analytical methods.

(a) Analyses for lead, copper, pH, alkalinity, orthophosphate, and silica shall be conducted in accordance with methods in § 141.23(k)(1).

(1) Analyses for alkalinity, orthophosphate, pH, and silica may be performed by any person acceptable to the State. Analyses under this section for lead and copper shall only be conducted by laboratories that have been certified by EPA or the State. To obtain certification to conduct analyses for lead and copper, laboratories must:

* * * * *

(iii) Achieve method detection limit for lead of 0.001 mg/L according to the procedures in appendix B of part 136 of this title.

* * * * *

■ 14. Amend § 141.90 by:

■ a. Revising paragraphs (a)(1) introductory text and (a)(1)(i);

■ b. Adding paragraph (a)(1)(iii);

■ c. Revising paragraphs (a)(1)(iv) through (vi);

■ d. Removing the period at the end of paragraph (a)(1)(viii) and adding ''; and'' in its place;

■ e. Adding paragraph (a)(1)(ix);

■ f. Revising paragraphs (a)(2) introductory text, (a)(2)(i), (a)(3), and (a)(4)(i);

■ g. Removing paragraph (a)(4)(iv);

■ h. Revising paragraphs (c)(1), (e), (f)(1)(i), and (f)(3);

■ i. Adding paragraphs (f)(4) through (7);

■ j. Revising paragraphs (g), (h) introductory text, (h)(1), (h)(2)(i) and (ii), and (h)(3);

■ k. Adding paragraphs (i) and (j).

The revisions and additions read as follows:

§ 141.90 Reporting requirements.

* * * * *

(a) * * *

(1) Notwithstanding the requirements of § 141.31(a), except as provided in paragraph (a)(1)(viii) of this section, a water system must report the information specified in paragraphs (a)(1)(i) through (ix) of this section, for all tap water samples specified in § 141.86 and for all water quality parameter samples specified in § 141.87 within the first 10 days following the end of each applicable tap sampling monitoring period specified in §§ 141.86 and 141.87 (*i.e.,* every six months, annually, every three years, or every nine years). For tap sampling periods with a duration less than six months, the end of the tap sampling monitoring period is the last date samples can be collected during that tap sampling period as specified in §§ 141.86 and 141.87.

(i) The results of all tap samples for lead and copper including the location of each site and the site selection criteria under § 141.86(a)(3) through (10), used as the basis for which the site was selected for the water system's sampling pool, accounting for § 141.86(a)(11);

* * * * *

(iii) Water systems with lead service lines, galvanized service lines requiring replacement, or lead status unknown service lines in the lead service line inventory conducted under § 141.84(a) must re-evaluate the tap sampling locations used in their sampling pool prior to the compliance date specified in § 141.80(a) and thereafter prior to the next round of tap sampling conducted by the system, or annually, whichever is more frequent.

(A) By the start of the first applicable tap sampling monitoring period in § 141.86(d), the water system must submit a site sample plan to the State in accordance with § 141.86, including a list of tap sample site locations identified from the inventory in § 141.84(a), and a list a tap sampling WQP sites selected under 141.87(a)(1). The site sample plan must be updated and submitted to the State prior to any changes to sample site locations. The State may require modifications to the site sample plan as necessary.

(B) For lead service line systems with insufficient lead service line sites to meet the minimum number required in § 141.86, documentation in support of the conclusion that there are an insufficient number of lead service line sites meeting the criteria under § 141.86(a)(3) or (4) for community water systems or § 141.86(a)(8) for non-transient, non-community water systems, as applicable;

(iv) The 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each tap sampling period (calculated in accordance with § 141.80(c)(4)), unless the State calculates the water system's 90th percentile lead and copper levels under paragraph (h) of this section;

(v) With the exception of initial tap sampling conducted pursuant to § 141.86(d)(1)(i), the water system must identify any site which was not sampled during previous tap sampling periods, and include an explanation of why sampling sites have changed;

(vi) The results of all water quality parameter tap samples that are required to be collected under § 141.87(b) through (g);

* * * * *

(ix) By the start of the first applicable tap sampling period in § 141.86(d), the water system must submit to the State, a copy of the tap sampling protocol that is provided to individuals who are sampling. The State shall verify that wide-mouth collection bottles are used and recommendations for pre-stagnation flushing and aerator cleaning or removal prior to sample collection are not included pursuant to § 141.86(b). The tap sampling protocol shall contain instructions for correctly collecting a first draw sample for sites without lead service lines and a first draw and a fifth liter sample for sites with lead service lines, where applicable. If the water system seeks to modify its tap sampling protocol specified in this paragraph (a)(1)(ix), it must submit the updated version of the protocol to the State for review and approval no later than 60 days prior to use.

(2) For a non-transient non-community water system, or a

community water system meeting the criteria of § 141.86(b)(5), that does not have enough taps that can provide first draw or fifth liter samples, the water system must either:

(i) Provide written documentation to the State identifying standing times and locations for enough non-first-draw and fifth liter samples to make up its sampling pool under § 141.86(b)(5) by the start of the first applicable monitoring period under § 141.86(d) unless the State has waived prior State approval of non-first-draw and fifth liter sample sites selected by the water system pursuant to § 141.86(b)(5); or

* * * * *

(3) At a time specified by the State, or if no specific time is designated by the State, as early as possible but no later than six months prior to the addition of a new source or any long-term change in water treatment, a water system must submit written documentation to the State describing the addition. The State must review and approve the addition of a new source or long-term treatment change before it is implemented by the water system. The State may require the system to take actions before or after the addition of a new source or long-term treatment change to ensure the system will operate and maintain optimal corrosion control treatment such as additional water quality parameter monitoring, additional lead or copper tap sampling, and re-evaluation of corrosion control treatment. Examples of long-term treatment changes include but are not limited to, the addition of a new treatment process or modification of an existing treatment process. Examples of modifications include switching secondary disinfectants, switching coagulants (*e.g.,* alum to ferric chloride), and switching corrosion inhibitor products (*e.g.,* orthophosphate to blended phosphate). Long-term changes can also include dose changes to existing chemicals if the water system is planning long-term changes to its finished water pH or residual inhibitor concentration. Long-term treatment changes would not include chemical dose fluctuations associated with daily raw water quality changes where a new source has not been added.

(4) * * *

(i) By the start of the first applicable tap sampling monitoring period in § 141.86(d), any small water system applying for a monitoring waiver shall provide the documentation required to demonstrate that it meets the waiver criteria of § 141.86(g)(1) and (2).

* * * * *

(c) * * *

(1) For water systems demonstrating that they have already optimized corrosion control, information required in § 141.81(b)(1) through (3).

* * * * *

(e) *Lead service line inventory and replacement reporting requirements.* Water systems must report the following information to the State to demonstrate compliance with the requirements of §§ 141.84 and 141.85:

(1) No later than January 16, 2024, the water system must submit to the State an inventory of service lines as required in § 141.84(a).

(2) No later than January 16, 2024, any water system that has inventoried a lead service line, galvanized requiring replacement, or lead status unknown service line in its distribution system must submit to the State, as specified in Section § 141.84(b), a lead service line replacement plan.

(3) The water system must provide the State with updated versions of its inventory as required in § 141.84(a) in accordance with its tap sampling monitoring period schedule as required in § 141.86(d), but no more frequently than annually. The updated inventory must be submitted within 30 days of the end of each tap sampling monitoring period.

(i) When the water system has demonstrated that it has no lead, galvanized requiring replacement, or lead status unknown service lines in its inventory, it is no longer required to submit inventory updates to the State, except as required in paragraph (e)(3)(ii) of this section.

(ii) In the case that a water system meeting the requirements of paragraph (e)(3)(i) of this section, subsequently discovers any service lines requiring replacement in its distribution system, it must notify the State within 30 days of identifying the service line(s) and prepare an updated inventory in accordance with § 141.84(a) on a schedule established by the State.

(4) Within 30 days of the end of each tap sampling monitoring period, the water system must certify that it conducted replacement of any encountered lead goosenecks, pigtails, and connectors in accordance with § 141.84(c).

(5) Within 30 days of the end of each tap sampling monitoring period, the water system must certify to the State that any partial and full lead service line replacements were conducted in accordance with § 141.84(d) and (e), respectively.

(6) If the water system fails to meet the 45-day deadline to complete a customer-initiated lead service line replacement pursuant to § 141.84(d)(4), it must notify the State within 30 days of the replacement deadline to request an extension of the deadline up to 180 days of the customer-initiated lead service line replacement.

(i) The water system must certify annually that it has completed all customer-initiated lead service line replacements in accordance with § 141.84(d)(4).

(ii) [Reserved]

(7) No later than 30 days after the end of the water system's annual lead service line replacement requirements under § 141.84(f) and (g), the water system must submit the following information to the State, and continue to submit it each year it conducts lead service line replacement under § 141.84(f) and (g):

(i) The number of lead service lines in the initial inventory;

(ii) The number of galvanized requiring replacement service lines in the initial inventory;

(iii) The number of lead status unknown service lines in the inventory at the onset of the water system's annual lead service line replacement program;

(iv) The number of full lead service lines that have been replaced and the address associated with each replaced service line;

(v) The number of galvanized requiring replacement service lines that have been replaced and the address associated with each replaced service line;

(vi) The number of lead status unknown service lines remaining in the inventory;

(vii) The total number of lead status unknown service lines determined to be non-lead; and

(viii) The total number of service lines initially inventoried as ''non-lead'' later discovered to be a lead service line or a galvanized requiring replacement service line.

(8) No later than 30 days after the end of each tap sampling period, any water system that has received customer refusals about lead service line replacements or customer non-responses after a minimum of two good faith efforts by the water system to contact customers regarding full lead service line replacements in accordance with § 141.84(g)(7), must certify to the State the number of customer refusals or non-responses it received from customers served by a lead service line or galvanized requiring replacement service line, and maintain such documentation.

(9) No later than 12 months after the end of a tap sampling period in which a water system exceeds the lead action level in sampling conducted pursuant to § 141.86, the system must provide to the State its schedule for annually replacing an average annual rate, calculated on a two year rolling basis, of at least three percent, or otherwise specified in § 141.84(g)(9), of the number of known lead service lines and galvanized lines requiring replacement when the lead trigger or action level was first exceeded and lead status unknown service lines at the beginning of each year that required replacement occurs in its distribution system.

(10) No later than 12 months after the end of a sampling period in which a system exceeds the lead trigger level in sampling conducted pursuant to § 141.86, and every 12 months thereafter, the system shall certify to the State in writing that the system has:

(i) Conducted consumer notification as specified in §§ 141.84(f)(4) and 141.85(g) and

(ii) Delivered public education materials to the affected consumers as specified in § 141.85(a).

(iii) A water system that does not meet its annual service line replacement goal as required under § 141.84(f) must certify to the State in writing that the water system has conducted public outreach as specified in § 141.85(h). The water system must also submit the outreach materials used to the State.

(11) The annual submission to the State under paragraph (e)(10) of this section must contain the following information:

(i) The certification that results of samples collected between three months and six months after the date of a full or partial lead service line replacement were provided to the resident in accordance with the timeframes in § 141.85(d)(2). Mailed notices post-marked within three business days of receiving the results shall be considered ''on time.''

(ii) [Reserved]

(12) Any system which collects samples following a partial lead service line replacement required by § 141.84 must report the results to the State within the first ten days of the month following the month in which the system receives the laboratory results, or as specified by the State. States, at their discretion may eliminate this requirement to report these monitoring results, but water systems shall still retain such records. Systems must also report any additional information as specified by the State, and in a time and manner prescribed by the State, to verify that all partial lead service line replacement activities have taken place.

(13) Any system with lead service lines in its inventory must certify on an annual basis that the system has complied with the consumer notification of lead service line materials as specified in § 141.85(e).

(f) * * *

(1) * * *

(i) The public education materials that were delivered, and a demonstration that the water system has delivered the public education materials that meet the content requirements in § 141.85(a) and the delivery requirements in § 141.85(b); and

* * * * *

(3) No later than three months following the end of the tap sampling period, each water system must mail a sample copy of the consumer notification of tap results to the State along with a certification that the notification has been distributed in a manner consistent with the requirements of § 141.85(d).

(4) Annually by July 1, the water system must demonstrate to the State that it delivered annual consumer notification and delivered lead service line information materials to affected consumers with a lead, galvanized requiring replacement, or lead status unknown service line in accordance with § 141.85(e) for the previous calendar year. The water system shall also provide a copy of the notification and information materials to the State.

(5) Annually by July 1, the water system must demonstrate to the State that it conducted an outreach activity in accordance with § 141.85(h) when failing to meet the lead service line replacement goal as specified in § 141.84(f) for the previous calendar year. The water system shall also submit a copy to the State of the outreach provided.

(6) Annually, by July 1, the water system must certify to the State that it delivered notification to affected customers after any lead service line disturbance in accordance with § 141.85(f) for the previous calendar year. The water system shall also submit a copy of the notification to the State.

(7) Annually, by July 1, the water system must certify to the State that it delivered the required find-and-fix information to the State and local health departments for the previous calendar year.

(g) *Reporting of additional monitoring data.* Any water system which collects more samples than the minimum required, shall report the results to the State within the first 10 days following the end of the applicable monitoring period under §§ 141.86, 141.87, and 141.88 during which the samples are collected. This includes the monitoring data pertaining to ''find-and-fix'' pursuant to §§ 141.86(h) and 141.87(g). The system must certify to the State the number of customer refusals or non-responses for follow-up sampling under § 141.82(j) it received and information pertaining to the accuracy of the refusals or non-responses, within the first 10 days following the end of the applicable tap sampling period in which an individual sample exceeded the action level.

(h) *Reporting of 90th percentile lead and copper concentrations where the State calculates a water system's 90th percentile concentrations.* A water system is not required to report the 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each tap sampling monitoring period, as required by paragraph (a)(1)(iv) of this section if:

(1) The State has previously notified the water system that it will calculate the water system's 90th percentile lead and copper concentrations, based on the lead and copper tap results submitted pursuant to paragraph (h)(2)(i) of this section, and the water system provides the results of lead and copper tap water samples no later than 10 days after the end of the applicable tap sampling monitoring period;

(2) * * *

(i) The results of all tap samples for lead and copper including the location of each site and the criteria under § 141.86(a)(3) through (10) under which the site was selected for the water system's sampling pool; and

(ii) An identification of sampling sites utilized during the current tap sampling monitoring period that were not sampled during previous monitoring periods, and an explanation of why sampling sites have changed; and

(3) The State has provided the results of the 90th percentile lead and copper calculations, in writing, to the water system within 15 days of the end of the tap sampling period.

(i) *Reporting requirements for a community water system's public education and sampling in schools and child care facilities.* (1) A community water system shall send a report to the State by July 1 of each year for the previous calendar year's activity. The report must include the following:

(i) Certification that the water system made a good faith effort to identify schools and child care facilities in accordance with § 141.92(e). The good faith effort may include reviewing

customer records and requesting lists of schools and child care facilities from the primacy agency or other licensing agency. A water system that certifies that no schools or child care facilities are served by the water system is not required to include information in paragraphs (i)(1)(ii) through (iv) of this section in the report. If there are changes to schools and child care facilities that a water system serves, an updated list must be submitted at least once every five years in accordance with § 141.92(e).

(ii) Certification that the water system has delivered information about health risks from lead in drinking water to the school and child care facilities that they serve in accordance with § 141.92(a)(2) and (g)(1).

(iii) Certification that the water system has completed the notification and sampling requirements of § 141.92 and paragraphs (i)(1)(iii)(A) through (E) of this section at a minimum of 20 percent of elementary schools and 20 percent of child care facilities. Certification that the water system has completed the notification and sampling requirements of § 141.92(g) and paragraphs (i)(1)(iii)(A), (B), and (E) of this section for any secondary school(s) sampled. After a water system has successfully completed one cycle of required sampling in all elementary schools and child care facilities identified in § 141.92(a)(1), it shall certify completion of the notification and sampling requirements of § 141.92(g) and paragraphs (i)(1)(iii)(A), (B), and (E) of this section for all sampling completed in any school or child care facility, thereafter.

(A) The number of schools and child care facilities served by the water system;

(B) The number of schools and child care facilities sampled in the calendar year;

(C) The number of schools and child care facilities that have refused sampling;

(D) Information pertaining to outreach attempts for sampling that were declined by the school or child care facility; and

(E) The analytical results for all schools and child care facilities sampled by the water system in the calendar year.

(iv) Certification that sampling results were provided to schools, child care facilities, and local and State health departments.

(2) [Reserved]

(j) *Reporting requirements for small system compliance flexibility options.* By the applicable dates provided in paragraphs (j)(1) and (2), water systems implementing requirements pursuant to § 141.93, shall provide the following information to the State:

(1) Small water systems and non-transient, non-community water systems implementing the point-of-use device option under § 141.93(a)(3), shall report the results from the tap sampling required under § 141.93 no later than 10 days after the end of the tap sampling monitoring period. If the trigger level is exceeded, the water system must reach out to the homeowner and/or building management within 24 hours of receiving the tap sample results. The corrective action must be completed within 30 days. If the corrective action is not completed within 30 days, the system must provide documentation to the State within 30 days explaining why it was unable to correct the issue. Water systems selecting the point-of-use device option under § 141.93(a)(3) shall provide documentation to certify maintenance of the point-of-use devices unless the State waives the requirement of this paragraph (j)(1).

(2) Small community water systems and non-transient, non-community water systems implementing the small system compliance flexibility option to replace all lead-bearing plumbing under § 141.93(a)(4) must provide certification to the State that all lead-bearing material has been replaced on the schedule established by the State, within one year of designation of the option under § 141.93(a)(4).

■ 15. Revise § 141.91 to read as follows:

§ 141.91 Recordkeeping requirements.

Any system subject to the requirements of this subpart shall retain on its premises original records of all sampling data and analyses, reports, surveys, letters, evaluations, schedules, State determinations, and any other information required by §§ 141.81 through 141.88, 141.90, 141.92, and 141.93. Each water system shall retain the records required by this section for no fewer than 12 years.

■ 16. Add § 141.92 to read as follows:

§ 141.92 Monitoring for lead in schools and child care facilities.

All community water systems must conduct directed public education and lead monitoring at the schools and child care facilities they serve if those schools or child care facilities were constructed prior to January 1, 2014 or the date the State adopted standards that meet the definition of lead free in accordance with Section 1417 of the Safe Drinking Water Act, as amended by the Reduction of Lead in Drinking Water Act, whichever is earlier. Water systems must conduct lead sampling at elementary schools and child care facilities they serve once and on request of the facility thereafter. Water systems shall also conduct lead sampling at secondary schools they serve on request. The provisions of this section do not apply to a school or child care facility that is regulated as a public water system. The provisions in paragraph (a) of this section apply until a water system samples all the elementary schools and child care facilities they serve once as specified in paragraph (c) of this section. Thereafter, water systems shall follow the provisions as specified in paragraph (g) of this section.

(a) *Public education to schools and child care facilities.* (1) By the compliance date specified in § 141.80(a)(3), each water system must compile a list of schools and child care facilities served by the system.

(2) Each water system must contact elementary schools and child care facilities identified by the system in paragraph (a)(1) of this section to provide:

(i) Information about health risks from lead in drinking water on at least an annual basis consistent with the requirements of § 141.85(a);

(ii) Notification that the water system is required to sample for lead at elementary schools and child care facilities, including:

(A) A proposed schedule for sampling at the facility;

(B) Information about sampling for lead in schools and child care facilities (EPA's 3Ts for Reducing Lead in Drinking Water Toolkit, EPA–815–B–18–007 or subsequent EPA guidance); and

(C) Instructions for identifying outlets for sampling and preparing for a sampling event 30 days prior to the event.

(3) The water system must include documentation in accordance with § 141.90(i) if an elementary school or child care facility is non-responsive or otherwise declines to participate in the monitoring or education requirements of this section. For the purposes of this section, a school or child care facility is non-responsive after the water system makes at least two separate good faith attempts to contact the facility to schedule sampling with no response.

(4) The water system must contact all secondary schools in paragraph (a)(1) of this section on at least an annual basis to provide information on health risks from lead in drinking water and how to request lead sampling as specified in paragraph (g)(1) of this section.

(b) *Lead sampling in schools and child care facilities.* (1) Five samples per

school and two samples per child care facility at outlets typically used for consumption shall be collected. Except as provided in paragraphs (b)(1)(i) through (vi) of this section, the outlets shall not have point-of-use (POU) devices. The water system shall sample at the following locations:

(i) For schools: two drinking water fountains, one kitchen faucet used for food or drink preparation, one classroom faucet or other outlet used for drinking, and one nurse's office faucet, as available.

(ii) For child care facilities: one drinking water fountain and one of either a kitchen faucet used for preparation of food or drink or one classroom faucet or other outlet used for drinking.

(iii) If any facility has fewer than the required number of outlets, the water system must sample all outlets used for consumption.

(iv) The water system may sample at outlets with POU devices if the facility has POU devices installed on all outlets typically used for consumption.

(v) If any facility does not contain the type of faucet listed above, the water system shall collect a sample from another outlet typically used for consumption as identified by the facility.

(vi) Water systems must collect the samples from the cold water tap subject to the following additional requirements:

(A) Each sample for lead shall be a first draw sample;

(B) The sample must be 250 ml in volume;

(C) The water must have remained stationary in the plumbing system of the sampling site (building) for at least 8 but no more than 18 hours; and

(D) Samples must be analyzed using acidification and the corresponding analytical methods in § 141.89.

(2) The water system, school or child care facility, or other appropriately trained individual may collect samples in accordance with paragraph (b)(1) of this section.

(c) *Frequency of sampling at elementary schools and child care facilities.* (1) Water systems shall collect samples from at least 20 percent of elementary schools served by the system and 20 percent of child care facilities served by the system per year, or according to a schedule approved by the State, until all schools and child care facilities identified under paragraph (a)(1) of this section have been sampled or have declined to participate. For the purposes of this section, a water system may count a refusal or non-response from an elementary school or child care facility as part of the minimum 20 percent per year.

(2) All elementary schools and child care facilities must be sampled at least once in the five years following the compliance date in § 141.80(a)(3).

(3) After a water system has completed one required cycle of sampling in all elementary schools and child care facilities, a water system must sample at the request of an elementary school or child care facility in accordance with paragraph (g) of this section.

(4) A water system must sample at the request of a secondary school as specified in paragraph (g) of this section. If a water system receives requests from more than 20 percent of secondary schools identified in paragraph (a)(1) of this section in any of the five years following the compliance date in § 141.80(a)(3), the water system may schedule the requests that exceed 20 percent for the following year and is not required to sample an individual secondary school more than once in the five year period.

(d) *Alternative school and child care lead sampling programs.* (1) If mandatory sampling for lead in drinking water is conducted for schools and child care facilities served by a community water system due to State or local law or program, the State may exempt the water system from the requirements of this section by issuing a written waiver:

(i) If the sampling is consistent with the requirements in paragraphs (b) and (c) of this section; or

(ii) If the sampling is consistent with the requirements in paragraphs (b)(1)(i) through (vi) and (c) of this section and it is coupled with any of the following remediation actions:

(A) Disconnection of affected fixtures;

(B) Replacement of affected fixtures with fixtures certified as lead free; and

(C) Installation of POU devices; or

(iii) If the sampling is conducted in schools and child care facilities served by the system less frequently than once every five years and it is coupled with any of the remediation actions specified in paragraph (d)(1)(ii) of this section; or

(iv) If the sampling is conducted under a grant awarded under Section 1464(d) of the SDWA, consistent with the requirements of the grant.

(2) The duration of the waiver may not exceed the time period covered by the mandatory or voluntary sampling and will automatically expire at the end of any 12-month period during which sampling is not conducted at the required number of schools or child care facilities.

(3) The State may issue a partial waiver to the water system if the sampling covers only a subset of the schools or child care facilities served by the system as designated under paragraph (a)(1) of this section.

(4) The State may issue a written waiver applicable to more than one system (*e.g.,* one waiver for all systems subject to a statewide sampling program that meets the requirements of paragraph (d) of this section).

(e) *Confirmation or revision of schools and child care facilities in inventory.* A water system shall either confirm that there have been no changes to its list of schools and child care facilities served by the system developed pursuant to paragraph (a)(1) of this section, or submit a revised list at least once every five years.

(f) *Notification of results.* (1) A water system must provide analytical results as soon as practicable but no later than 30 days after receipt of the results to the school or child care facility, along with information about remediation options.

(2) A water system must provide analytical results annually to:

(i) The local and State health department; and

(ii) The State in accordance with § 141.90(i).

(g) *Lead sampling in schools and child care facilities on request.* (1) A water system must contact schools and child care facilities identified in paragraph (a)(1) of this section on at least an annual basis to provide:

(i) Information about health risks from lead in drinking water;

(ii) Information about how to request sampling for lead at the facility; and

(iii) Information about sampling for lead in schools and child care facilities (EPA's 3Ts for Reducing Lead in Drinking Water Toolkit, EPA–815–B–18–007, or subsequent EPA guidance).

(2) A water system must conduct sampling as specified in paragraph (b) of this section when requested by the facility and provide:

(i) Instructions for identifying outlets for sampling and preparing for a sampling event at least 30 days prior to the event; and

(ii) Results as specified in paragraph (f) of this section.

(3) If a water system receives requests from more than 20 percent of the schools and child care facilities identified in paragraph (a)(1) of this section in a given year, the water system may schedule sampling for those that exceed 20 percent for the following year. A water system is not required to sample an individual school or child care facility more than once every five years.

(4) If voluntary sampling for lead in drinking water is conducted for schools

and child care facilities served by a community water system that meets the requirements of this section, the State may exempt the water system from the requirements of this section by issuing a written waiver in accordance with paragraph (d) of this section.

■ 17. Add § 141.93 to read as follows:

§ 141.93 Small water system compliance flexibility.

The compliance alternatives described in this section apply to small community water systems serving 10,000 or fewer persons and all non-transient, non-community water systems. Small community water systems and non-transient, non-community water systems with corrosion control treatment in place must continue to operate and maintain optimal corrosion control treatment until the State determines, in writing, that it is no longer necessary, and meet any requirements that the State determines to be appropriate before implementing a State approved compliance option described in this section.

(a) A small community water system and non-transient, non-community water systems that exceeds the lead trigger level but does not exceed the lead and copper action levels must collect water quality parameters in accordance with § 141.87(b) and evaluate compliance options in paragraphs (a)(1) through (4) of this section and make a compliance option recommendation to the State within six months of the end of the tap sampling period in which the exceedance occurred. The State must approve the recommendation or designate an alternative from compliance options in paragraphs (a)(1) through (4) of this section within six months of the recommendation by the water system. If the water system subsequently exceeds the lead action level it must implement the approved compliance option as specified in paragraph (b) of this section. Water systems must select from the following compliance options:

(1) *Lead service line replacement.* A water system must implement a full lead service line replacement program on a schedule approved by the State but not to exceed 15 years. A water system must begin lead service line replacement within one year after the State's approval or designation of the compliance option.

(i) Lead service line replacement must be conducted in accordance with the requirements of § 141.84(e) and (g)(4), (8), and (9).

(ii) A water system must continue lead service line replacement even if the system's 90th percentile lead level is at or below the action level in future tap sampling monitoring periods.

(iii) A water system must have no lead service lines, galvanized service lines requiring replacement, or ''Lead status unknown'' service lines in its inventory by the end of its lead service line replacement program.

(2) *Corrosion control treatment.* A water system must install and maintain optimal corrosion control treatment in accordance with §§ 141.81 and 141.82, even if its 90th percentile is at or below the action level in future tap sampling monitoring periods. Any water system that has corrosion control treatment installed must re-optimize its corrosion control treatment in accordance with § 141.81(d). Water systems required by the State to optimize or re-optimize corrosion control treatment must follow the schedules in § 141.81(d) or (e), beginning with Step 3 in paragraph (d)(3) or (e)(3) of § 141.81 unless the State specifies optimal corrosion control treatment pursuant to either § 141.81(d)(2)(ii) or (e)(2)(i) or (ii), as applicable.

(3) *Point-of-use devices.* A water system must install, maintain, and monitor POU devices in each household or building even if its 90th percentile is at or below the action level in future tap sampling monitoring periods.

(i)(A) A community water system must install a minimum of one POU device (at one tap) in every household and at every tap that is used for cooking and/or drinking in every non-residential building in its distribution system on a schedule specified by the State, but not to exceed one year.

(B) A non-transient, non-community water system must provide a POU device to every tap that is used for cooking and/or drinking on a schedule specified by the State, but not to exceed three months.

(ii) The POU device must be independently certified by a third party to meet the American National Standards Institute standard applicable to the specific type of POU unit to reduce lead in drinking water.

(iii) The POU device must be maintained by the water system according to manufacturer's recommendations to ensure continued effective filtration, including but not limited to changing filter cartridges and resolving any operational issues. POU device must be equipped with mechanical warnings to ensure that customers are automatically notified of operational problems. The water system shall provide documentation to the state to certify maintenance of the point-of-use devices, unless the state waives this requirement, in accordance with § 141.90(j)(1).

(iv) The water system must monitor one-third of the POU devices each year and all POU devices must be monitored within a three-year cycle. First draw tap samples collected under this section must be taken after water passes through the POU device to assess its performance. Samples must be one-liter in volume and have had a minimum 6-hour stagnation time. All samples must be at or below the lead trigger level. The water systems must report the results from the tap sampling no later than 10 days after the end of the tap sampling monitoring period in accordance with § 141.90(j)(1). The system must document the problem and take corrective action at any site where the sample result exceeds the lead trigger level. If the trigger level is exceeded, the water system must reach out to the homeowner and/or building management no later than 24 hours of receiving the tap sample results. The corrective action must be completed within 30 days. If the corrective action is not completed within 30 days, the system must provide documentation to the State within 30 days explaining why it was unable to correct the issue.

(v) The water system must provide public education to consumers in accordance with § 141.85(j) to inform them on proper use of POU devices to maximize the units' lead level reduction effectiveness.

(vi) The water system must operate and maintain the POU devices until the system receives State approval to select one of the other compliance flexibility options and implements it.

(4) *Replacement of lead-bearing plumbing.* A water system that has control over all plumbing in its buildings, and no unknown, galvanized, or lead service lines, must replace all plumbing that is not lead free in accordance with Section 1417 of the Safe Drinking Water Act, as amended by the Reduction of Lead in Drinking Water Act and any future amendments applicable at the time of replacement. The replacement of all lead-bearing plumbing must occur on a schedule established by the State but not to exceed one year. Water systems must provide certification to the State that all lead-bearing material has been replaced in accordance with § 141.90(j)(2).

(b)(1) A water system that exceeds the lead action level after exceeding the lead trigger level but does not exceed the copper action level must implement the compliance option approved by the State under paragraph (a) of this section.

(2) A water system that exceeds the lead action level, but has not previously

exceeded the lead trigger level, and does not exceed the copper action level must complete the provisions in paragraph (a) of this section and must implement the compliance option approved by the State under paragraph (a) of this section.

(3) A water system that exceeds the trigger level after it has implemented a compliance option approved by the State under paragraph (a) of this section, must complete the steps in paragraph (a) and if it thereafter exceeds the action level, it must implement the compliance option approved by the State under paragraph (a) of this section.

■ 18. Amend § 141.153 by:

■ a. Revising paragraph (d)(4)(vi);

■ b. Removing the periods at the ends of paragraphs (d)(4)(ix) and (x) and adding semicolons in their places; and

■ c. Adding paragraphs (d)(4)(xi) and (xii).

The revision and additions read as follows:

§ 141.153 Content of the reports

* * * * *

(d) * * *

(4) * * *

(vi) For lead and copper: the 90th percentile concentration of the most recent round(s) of sampling, the number of sampling sites exceeding the action level, and the range of tap sampling results;

* * * * *

(xi) The report shall include a statement that a service line inventory (including inventories consisting only of a statement that there are no lead service lines) has been prepared and include instructions to access the service line inventory; and

(xii) The report shall notify consumers that complete lead tap sampling data are available for review and shall include information on how to access the data.

* * * * *

■ 19. Amend § 141.154 by revising paragraph (d)(1) to read as follows:

§ 141.154 Required additional health information.

* * * * *

(d) * * *

(1) A short informational statement about lead in drinking water and its effects on children. The statement must include the following information:

Lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. [NAME OF UTILITY] is responsible for providing high quality drinking water and removing lead pipes, but cannot control the variety of materials used in plumbing components in your home. You share the responsibility for protecting yourself and your family from the lead in your home plumbing. You can take responsibility by identifying and removing lead materials within your home plumbing and taking steps to reduce your family's risk. Before drinking tap water, flush your pipes for several minutes by running your tap, taking a shower, doing laundry or a load of dishes. You can also use a filter certified by an American National Standards Institute accredited certifier to reduce lead in drinking water. If you are concerned about lead in your water and wish to have your water tested, contact [NAME OF UTILITY and CONTACT INFORMATION]. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available at *http://www.epa.gov/safewater/lead.*

* * * * *

■ 20. Amend appendix A to subpart O by removing the entry ''Lead (ppb)'' and adding the entry ''Lead'' in its place to read as follows:

APPENDIX A TO SUBPART O OF PART 141—REGULATED CONTAMINANTS

Contaminant	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
*	*	*	*	*	*	*
Lead	AL = .015	1000	AL = 15	0	Corrosion of household plumbing systems, Erosion of natural deposits..	Exposure to lead in drinking water can cause serious health effects in all age groups. Infants and children can have decreases in IQ and attention span. Lead exposure can lead to new learning and behavior problems or exacerbate existing learning and behavior problems. The children of women who are exposed to lead before or during pregnancy can have increased risk of these adverse health effects. Adults can have increased risks of heart disease, high blood pressure, kidney or nervous system problems.
*	*	*	*	*	*	*

* * * * *

■ 21. Amend § 141.201 by adding paragraph (a)(3)(vi) and revising paragraph (c)(3) to read as follows:

§ 141.201 General public notification requirements.

* * * * *

(a) * * *

TABLE 1 TO § 141.201—VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A PUBLIC NOTICE

* * * * *	
(3) * * *	
(vi) Exceedance of the lead action level.	
* * * * *	

(c) * * *

(3) A copy of the notice must also be sent to the primacy agency and the Administrator (as applicable) in accordance with the requirements of § 141.31(d).

■ 22. Amend § 141.202 by adding paragraph (a)(10) to read as follows:

§ 141.202 Tier 1 Public Notice—Form, manner and frequency of notice.

(a) * * *

TABLE 1 TO § 141.202—VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A TIER 1 PUBLIC NOTICE

TABLE 1 TO § 141.202—VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A TIER 1 PUBLIC NOTICE—Continued

* * * * *	
(10) Exceedance of the Action Level for lead as specified in § 141.80(c).	
* * * * *	

■ 23. Amend appendix A to subpart Q by revising the entry for ''C. Lead and Copper Rule (Action Level for lead is 0.015 mg/L, for copper is 1.3 mg/L)'' to read as follows:

Appendix A To Subpart Q of Part 141—NPDWR Violations and Other Situations Requiring Public Notice [1]

* * * * *

Contaminant	MCL/MRDL/TT violations [2]		Monitoring & testing procedure violations	
	Tier of public notice required	Citation	Tier of public notice required	Citation
* * *	*	*	*	*
C. Lead and Copper Rule (Action Level for lead is 0.015 mg/L, for copper is 1.3 mg/L).				
1. Lead and Copper Rule (TT)	2	141.80 (except 141.80(c))–141.84, 141.85(a)–(c) and (h), and 141.93.	3	141.86–141.90
2. Exceedance of the Action Level for lead	1	141.80(c).		
* * *	*	*	*	*

* * * * *

■ 24. Amend appendix B to subpart Q by revising the entry for ''23. Lead'' to read as follows:

Appendix B to Subpart Q of Part 141—Standard Health Effects Language for Public Notification

Contaminant	MCLG [1] mg/L	MCL [2] mg/L	Standard health effects language for public notification
* * *	*	*	*
D. Lead and Copper Rule			
23. Lead	zero	TT [13]	Exposure to lead in drinking water can cause serious health effects in all age groups. Infants and children can have decreases in IQ and attention span. Lead exposure can lead to new learning and behavior problems or exacerbate existing learning and behavior problems. The children of women who are exposed to lead before or during pregnancy can have increased risk of these adverse health effects. Adults can have increased risks of heart disease, high blood pressure, kidney or nervous system problems.
* * *	*	*	*

* * * * *

[1] MCLG—Maximum contaminant level goal.

* * * * *

[2] MCL—Maximum contaminant level.

* * * * *

[13] Action Level = 0.015 mg/L.

* * * * *

■ 25. Amend § 141.401 by revising paragraph (c)(2) to read as follows:

§ 141.401 Sanitary surveys for ground water systems.

* * * * *

(c) * * *

(2) Treatment including corrosion control treatment and water quality parameters as applicable;

* * * * *

PART 142—NATIONAL PRIMARY DRINKING WATER REGULATIONS IMPLEMENTATION

■ 26. The authority citation for part 142 continues to read as follows:

Authority: 42 U.S.C. 300f, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–4, 300j–9, and 300j–11.

■ 27. Amend § 142.14 by:

■ a. Revising paragraphs (d)(8)(iii) through (v) and (viii);

■ b. Removing the word ''and'' at the end of paragraph (d)(8)(xvi);

■ c. Removing the period at the end of paragraph (d)(8)(xvii) and adding ''; and'' in its place;

[1] Violations and other situations not listed in this table (*e.g.,* failure to prepare Consumer Confidence Reports), do not require notice, unless otherwise determined by the primacy agency. Primacy agencies may, at their option, also require a more stringent public notice tier (*e.g.,* Tier 1 instead of Tier 2 or Tier 2 instead of Tier 3) for specific violations and situations listed in this Appendix, as authorized under § 141.202(a) and § 141.203(a).

[2] MCL—Maximum contaminant level, MRDL—Maximum residual disinfectant level, TT—Treatment technique.

■ d. Adding paragraphs (d)(8)(xviii) through (xx); and
■ e. Revising paragraph (d)(11).

The revisions and additions read as follows:

§ 142.14 Records kept by States.

* * * * *

(d) * * *

(8) * * *

(iii) Section 141.82(d)—designations of optimal corrosion control treatment and any simultaneous compliance considerations that factored into the designation;

(iv) Section 141.84(b)—lead service line replacement plans;

(v) Section 141.86(a)—compliance sampling pools and any changes to sampling pools;

* * * * *

(viii) Section 141.84(f) and (g)—determinations of lead service line replacement goal rate and determinations as to whether a shorter replacement schedule is feasible for mandatory full lead service line service line replacement;

* * * * *

(xviii) Section 141.88—evaluation and approval of water system source water or treatment changes;

(xix) Section 141.93—identification of small water systems and non-transient non-community water systems utilizing the compliance alternatives, and the compliance alternative selected by the water system and the compliance option approved by the State; and

(xx) Section 141.84(a)—completed lead service line inventories and required updates to inventories.

* * * * *

(11) Records of each system's currently applicable or most recently designated monitoring requirements. If, for the records identified in paragraphs (d)(8)(i) through (xx) of this section, no change is made to State determinations during a 12-year retention period, the State shall retain the record until a new decision, determination, or designation has been issued.

* * * * *

■ 28. Amend § 142.15 by:
■ a. Revising paragraphs (c)(4) introductory text, (c)(4)(i) introductory text, and (c)(4)(i)(A);
■ b. Removing and reserving paragraph (c)(4)(ii); and
■ c. Revising paragraphs (c)(4)(iii) introductory text and (c)(4)(iii)(A) through (E).

The revisions read as follows:

§ 142.15 Reports by States.

* * * * *

(c) * * *

(4) *Timing.* States shall report quarterly, in a format and on a schedule prescribed by the Administrator, the following information related to each system's compliance with the treatment techniques for lead and copper under 40 CFR part 141, subpart I, during the preceding calendar quarter. Specifically, States shall report as follows:

(i) States shall report the name and PWS identification number:

(A) Each public water system which exceeded the lead and copper action levels and the date upon which the exceedance occurred;

* * * * *

(iii) States shall report the PWS identification number of each public water system identified in paragraphs (c)(4)(iii)(A) through (F) of this section.

(A) For each public water system, regardless of size, all 90th percentile lead levels calculated during each tap sampling period specified in § 141.86 of this chapter, and the first and last days of the tap sampling period for which the 90th percentile lead level was calculated;

(B) For each public water system (regardless of size), the 90th percentile copper level calculated during each monitoring period in which the system exceeds the copper action level, and the first and last days of each monitoring period in which an exceedance occurred;

(C) For each public water system for which the State has designated optimal water quality parameters under § 141.82(f) of this chapter, or which the State has deemed to have optimized corrosion control under § 141.81(b)(1) or (3) of this chapter, the date of the determination and the paragraph(s) under which the State made its determination, the corrosion control treatment status of the water system, and the water system's optimal water quality parameters;

(D) For each public water system, the number of lead, galvanized requiring replacement, and lead status unknown service lines in its distribution system, reported separately;

(E) For each public water system required to begin replacing lead service lines after a lead trigger level or action level exceedance, as specified in § 141.84 of this chapter, the goal or mandatory replacement rate, and the date each system must begin replacement; and

* * * * *

■ 29. Amend § 142.16 by:
■ a. Revising paragraph (b)(3)(i)(B);
■ b. Adding paragraphs (d)(5) through (10); and
■ c. Revising paragraph (o)(2)(i)(B).

The revisions and additions read as follows:

§ 142.16 Special primacy requirements.

* * * * *

(b) * * *

(3) * * *

(i) * * *

(B) Treatment, including corrosion control treatment and water quality parameters as applicable.

* * * * *

(d) * * *

(5) Section 141.84—Providing or requiring the review of any resource, information, or identification method for the development of the initial inventory or inventory updates. Requiring water systems whose inventories contain only non-lead service lines and the water system subsequently finds a lead service line to prepare an updated inventory on a schedule determined by the State.

(6) Section 141.84—For community water systems serving greater than 10,000 persons, approving the lead service line replacement goal rate as recommended by the water system in its lead service line replacement plan, or designating an alternative goal rate than recommended, within six months of the compliance date specified in § 141.80(a) of this chapter.

(7) Section 141.84(g)(9)—Determining whether a greater mandatory lead service line replacement rate is feasible and notifying the system of the determination in writing within 6 months after the system is required to begin lead service line replacement (LSLR).

(8) Section 141.92—Defining a school or child care facility and determining any existing State or local testing program is at least as stringent as the Federal requirements.

(9) Section 141.82—Verifying compliance with ''find-and-fix'' requirements.

(10) Section 141.88—Reviewing any change in source water or treatment and making related determinations, including approval; establishment of additional requirements to ensure the system will operate and maintain optimal corrosion control treatment; and an evaluation of how this change may impact other national primary drinking water regulations in part 141 of this chapter.

* * * * *

(o) * * *

(2) * * *

(i) * * *

(B) Treatment, including corrosion control treatment and water quality parameters as applicable;

* * * * *

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