

LEAD AND COPPER RULE OF THE SAFE DRINKING WATER ACT

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2022 GREAT LAKES WATER CONFERENCE



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HEALTH EFFECTS OF LEAD EXPOSURE

EPA summarized: Lead is a highly toxic pollutant that can damage neurological, cardiovascular, immunological, developmental, and other major body systems

- **Exposure to lead during infancy and childhood can cause:**
 - Damage to the brain and nervous system
 - Slowed growth and development
 - Learning and behavioral problems
 - Hearing and speech problems
- **Exposure to lead during pregnancy can cause:**
 - Miscarriage and stillbirth
 - Premature delivery
 - Preeclampsia
 - Low birth weight
- **Exposure to lead during adulthood can cause:**
 - Cardiovascular effects
 - Decreased kidney function
 - Increased blood pressure and onset of hypertension

DISPROPORTIONATE EFFECTS

Harm from lead exposure is not distributed equally

see Review of the National Primary Drinking Water Regulation: Lead and Copper Rule Revisions (LCRR), 86 Fed. Reg. 71575 (Dec. 17, 2021).

- People of color and low-wealth populations disproportionately exposed to **lead in drinking water**:
 - More likely living in older housing with lead pipes
 - Often fewer resources to pay to remove or remediate privately owned portions of LSL
 - Often renters, landowner refuses to pay for replacement
- People of color and low-wealth populations disproportionately exposed to **lead in other sources**:
 - Children more frequently live near lead-emitting industries and in areas with lead-contaminated soils
 - Non-Hispanic black people >2x as likely as non-Hispanic whites to live in housing with deteriorating lead-based paint

LEAD IN DRINKING WATER

ANY LEVEL OF LEAD PRESENTS RISK OF HARM

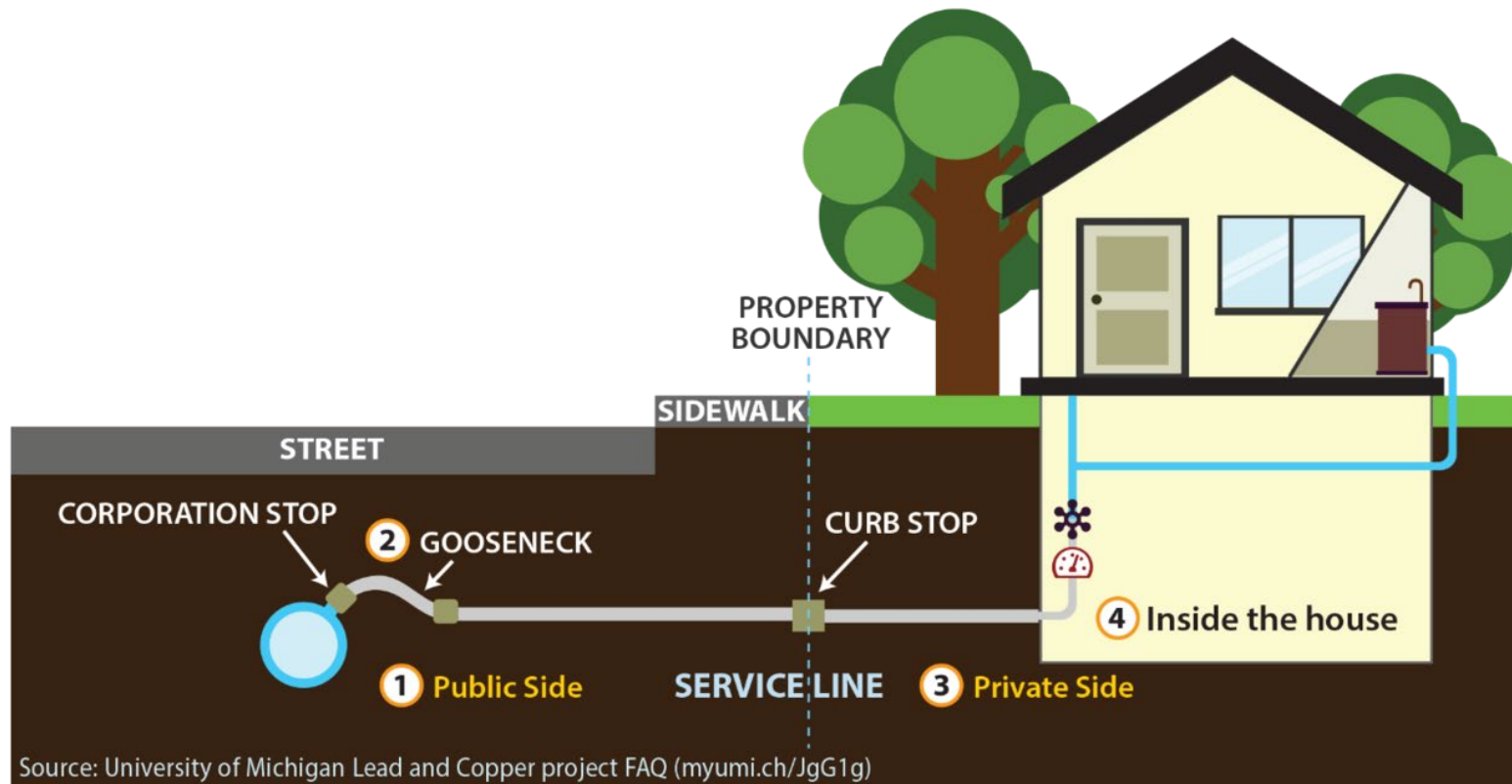
Water can be primary or sole source of lead exposure

Lead in drinking water generally accounts for 20% of all lead exposure, which EPA can increase up to 80% for children who drink formula made with tap water in homes with LSLs



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HOW LEAD GETS INTO DRINKING WATER



EPA: LEAD SERVICE LINES ARE “THE GREATEST CONTRIBUTOR OF LEAD IN DRINKING WATER.”

- Not naturally found in water
- Leaches from lead service lines, fixtures and plumbing; lead bearing items like solder and brass
- Many factors can cause lines to leach
- Est. 6-10 million US homes have lead service lines, serving at least 15 million people
- Contamination varies widely day to day

Source: University of Michigan Lead and Copper project FAQ (myumi.ch/JgG1g)

FEDERAL ACTION ON LEAD

1978: banned the use of lead in paint

1986: banned installation of new lead pipes

1991: First Lead and Copper Rule

1996: final steps to eliminate lead in gasoline

2022: *EPA still allows public water systems to deliver drinking water to homes via lead service lines*



HOW LEAD IN DRINKING WATER IS REGULATED

The Lead and Copper Rule is a regulation promulgated under the Safe Drinking Water Act

The Lead and Copper Rule is a treatment technique, not a maximum contaminant level

EPA may avoid setting an MCL only if it is “not economically or technologically feasible to ascertain the level of the contaminant” in water

Maximum Contaminant Level (MCL):

- The maximum **level** of a contaminant allowed in water delivered to any user of a public water system
- MCL must be set as close to level that causes no harm (for lead would be 0) as feasible
- exceeding an MCL is a violation

Treatment Technique:

- A required **process** public water systems must follow to reduce the level of a contaminant
- Must prevent known or anticipated harm to health to extent feasible
- Only failing to follow the process is a violation; lead level doesn't matter

HOW THE 1991 LEAD AND COPPER RULE WORKS

- Water systems sample from <100 (or more if they choose) sites likely to have lead service lines
 - Lead Action Level = 15 ppb
 - 10% or more of the sites sampled exceed the lead action level = “action level exceedance”
- If there is an action level exceedance, corrective action is required:
 - corrosion control treatment
 - public education
 - Lead service line replacement on public side



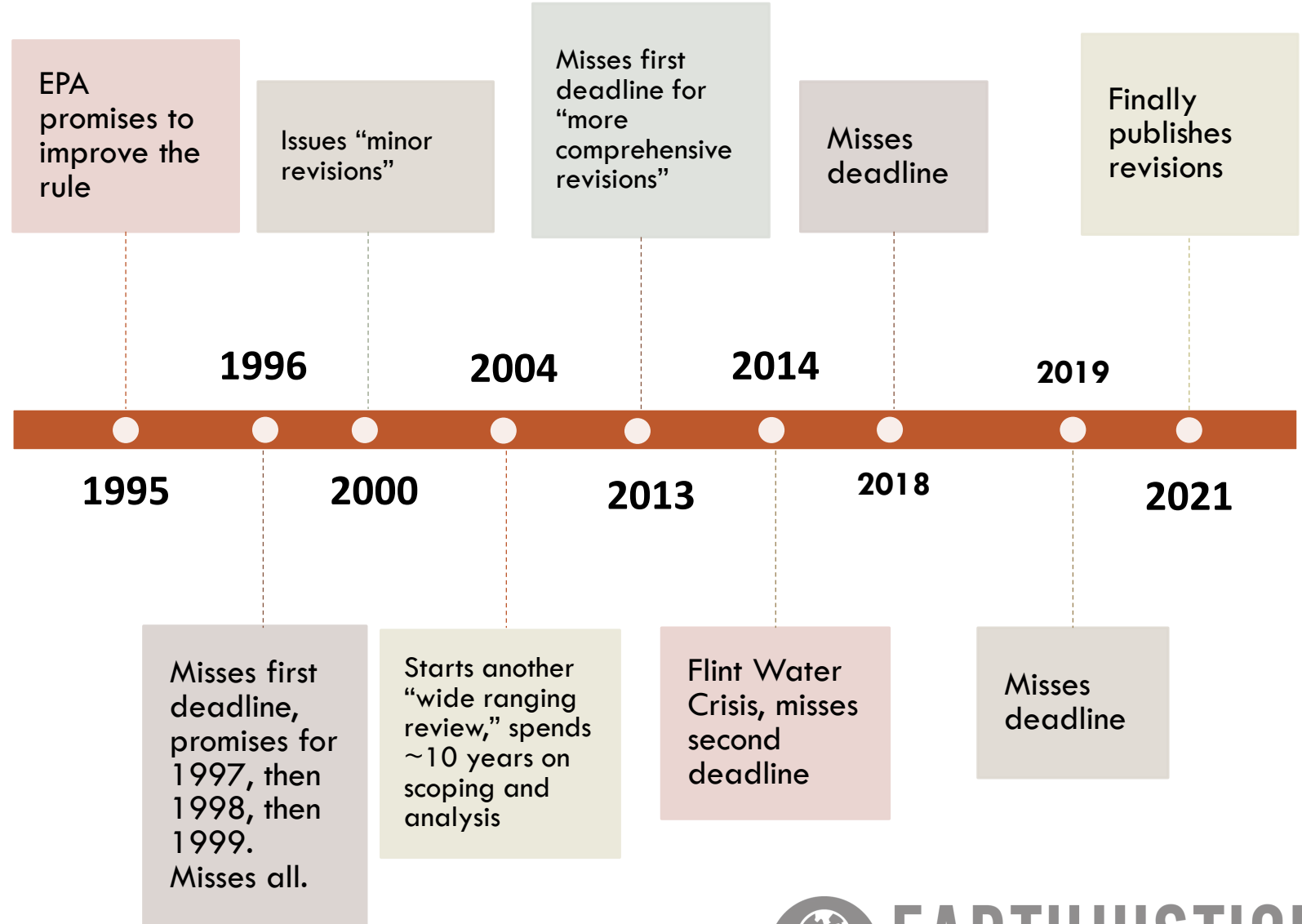
MAJOR PROBLEMS OF 1991 LCR

- No maximum contaminant level; no individual protection
- Reactive; not proactive
- Ineffective public education
- Flawed and unreliable sampling and monitoring
- Lead levels vary widely day to day; only get a snapshot in time
- High/not health-based “lead action level”
- Definition of “exceedance” requiring action—and 10%/90% rule
- After exceedance:
 - corrosion control first
 - line replacement at a rate of only 7%/yr;
 - partials count and can test out;
 - can require customer to pay
- No requirements or effective incentives for schools
- Meager enforcement



EPA MISSES DEADLINES TO IMPROVE LCR

The LCR is known as extremely ineffective environmental regulation; yet no major revisions from enactment in 1991 until 2021



LEAD SERVICE LINE REPLACEMENT

The best way to
reduce exposure to
lead in drinking water

- **2015:** EPA's National Drinking Water Advisory Council **recommends EPA require water systems to completely replace all lead service lines,** regardless of testing results
- **2017:** American Water Works Association endorses the recommendation
- Call for complete lead service line replacement also joined by
 - American Water (the private owner and operator of more than 300 drinking water systems in 46 states)
 - Association of State Drinking Water Administrators
 - numerous community groups, scientists and environmental organizations
- EPA: the removal of all lead service lines is “critical” and “urgently needed” to protect public health

2021: NEW REVISED LCR (LCRR)

	Revised LCR
Inventory	<ul style="list-style-type: none">• <u>All</u> systems must develop an LSL inventory within 3 years<ul style="list-style-type: none">• Inventory must be updated 1/year or 1/3years• All systems with <u>known or possible</u> LSLs must develop an LSLR <u>plan</u>
Monitoring	<ul style="list-style-type: none">• Improved sample site selection criteria• Some improvement on batch testing
Trigger level	New level of 10ppb triggers planning, monitoring, and treatment requirements
Action Level	No change (remains 15ppb, not health-based)
Replacement	<ul style="list-style-type: none">• No provision for complete lead service line replacement• Slows down LSLR to 3% when LAL exceedance (previously 7%)<ul style="list-style-type: none">• Doesn't count partials towards 3%• No test-outs• Does not prohibit charging homeowner for private side replacement

2021: NEW REVISED LCR (LCRR) (cont.)

	Revised LCR
Small water systems (92%)	<ul style="list-style-type: none">• Menu of options after exceedance• Does not require LSLR
Schools	<ul style="list-style-type: none">• Required to sample 20% of the system each year• Provide results only to school and public health agencies, not directly to parents• No required remediation
Notification	Must inform consumers if sample >15ppb, no later than 3 days
Find and Fix	If individual tap sample exceeds 15ppb: <ul style="list-style-type: none">• Collect sample at same tap within 30 days• For systems with corrosion control treatment, conduct WQP monitoring at or near the site• Perform needed corrective action• Provide information to local public health officials

HOW SHOULD LCR/LCRR BE CHANGED?

BEST APPROACH: Prevention-oriented to stop exposure

- Replace LSLs, speedily and equitably
 - Within 10 years
 - Regardless of testing results
 - Prohibit partials
 - No homeowner cost
- Incentivize school and childcare centers towards “filter first”
- Comprehensive and accurate public education

Beyond prevention-oriented

- Require maximum contaminant level
- If keep treatment technique,
 - Lower the LAL to no higher than 5ppb
 - Better sampling and monitoring
 - Lower percentile needed for exceedance
 - Do not allow any systems to avoid LSLR and speed up replacements
 - Prohibit charging homeowners for LSLR
 - Incentivize states to implement rigorous programs to decrease lead in school water



BIDEN ADMINISTRATION PLANS

The administration has not made concrete plans or promises, but has stated intent to improve the LCR

see Review of the National Primary Drinking Water Regulation: Lead and Copper Rule Revisions (LCRR), 86 Fed. Reg. 71577-71579 (Dec. 17, 2021)

Plans to propose new rule to revise and improve LCRR by Oct 2024 (LCRI).

Is considering through LCRI and other regulatory actions:

- Replacement of all LSL quickly
- Increase health equity for those that cannot afford LSLR
- Prioritize communities most at risk
- Reduce complexity of regulations
- Improving sampling methods
- Lowering LAL and eliminate or lower trigger levels
- Small system flexibility
- School and child-care sampling
- Risk communication
- Corrosion control treatment



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Reference Guide for Public Water Systems Lead and Copper Rule Comparison

This table compares the major differences between the current Lead and Copper Rule (LCR) and the final Lead and Copper Rule revisions (LCRR). In general, requirements that are unchanged are not listed. For existing rule requirements visit: <https://www.epa.gov/dwreginfo/lead-and-copper-rule>. For more information on the new LCR visit: <https://www.epa.gov/ground-water-and-drinking-water/final-revisions-lead-and-copper-rule>.

CURRENT LCR	FINAL REVISED LCRR
<i>Action Level (AL) and Trigger Level (TL)</i>	
<ul style="list-style-type: none"> 90th percentile (P90) level above lead AL of 15 µg/L or copper AL of 1.3 mg/L requires additional actions. 	<ul style="list-style-type: none"> 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.
<i>Lead and Copper Tap Monitoring</i>	
<p>Sample Site Selection</p> <ul style="list-style-type: none"> 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. 	<p>Sample Site Selection</p> <ul style="list-style-type: none"> 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.
<p>Collection Procedure</p> <ul style="list-style-type: none"> Requires collection of the first liter sample after water has sat stagnant for a minimum of 6 hours. 	<p>Collection Procedure</p> <ul style="list-style-type: none"> 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.

CURRENT LCR	FINAL REVISED LCRR
	<ul style="list-style-type: none"> Prohibits sampling instructions that include recommendations for aerator cleaning/removal and pre-stagnation flushing prior to sample collection.
<p>Monitoring Frequency</p> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Serves $\leq 50,000$ people and \leq lead & copper ALs. Serves any population size, meets state-specified optimal water quality parameters (OWQPs), and \leq 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 $\leq 3,300$. 	<p>Monitoring Frequency</p> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> P90 > 15 $\mu\text{g/L}$: Semi-annually at the standard number of sites. P90 > 10 to 15 $\mu\text{g/L}$: Annually at the standard number of sites. P90 ≤ 10 $\mu\text{g/L}$: <ul style="list-style-type: none"> 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.

CURRENT LCR	FINAL REVISED LCRR
<i>Corrosion Control Treatment (CCT) and Water Quality Parameters (WQPs)</i>	
<p>CCT</p> <ul style="list-style-type: none"> • 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 (<i>e.g.</i>, 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. 	<p>CCT</p> <ul style="list-style-type: none"> • Specifies CCT requirements for systems with $10 < P90 \text{ level} \leq 15 \mu\text{g/L}$: <ul style="list-style-type: none"> ○ 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 $P90 \text{ level} > 15 \mu\text{g/L}$: <ul style="list-style-type: none"> ○ 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. <i>See Small System Flexibility.</i>
<p>CCT Options: Includes alkalinity and pH adjustment, calcium hardness adjustment, and phosphate or silicate-based corrosion inhibitor.</p>	<p>CCT Options: Removes calcium hardness as an option and specifies any phosphate inhibitor must be orthophosphate.</p>
<p>Regulated WQPs:</p> <ul style="list-style-type: none"> • 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. 	<p>Regulated WQPs:</p> <ul style="list-style-type: none"> • Eliminates WQPs related to calcium hardness (<i>i.e.</i>, calcium, conductivity, and temperature).
<p>WQP Monitoring</p> <ul style="list-style-type: none"> • 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. 	<p>WQP Monitoring</p> <ul style="list-style-type: none"> • Systems serving ≥ 50,000 people must conduct regular WQP monitoring at entry points and within the distribution system.

CURRENT LCR	FINAL REVISED LCRR
<ul style="list-style-type: none"> Contains provisions to sample at reduced number of sites in distribution system less frequency for all systems meeting their OWQPs. 	<ul style="list-style-type: none"> Systems serving $\leq 50,000$ 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 $\leq 10 \mu\text{g/L}$ and the system must meet its OWQPs.
<p>Sanitary Survey Review:</p> <ul style="list-style-type: none"> Treatment must be reviewed during sanitary surveys; no specific requirement to assess CCT or WQPs. 	<p>Sanitary Survey Review:</p> <ul style="list-style-type: none"> CCT and WQP data must be reviewed during sanitary surveys against most recent CCT guidance issued by EPA.
<p>Find-and-Fix: No required follow-up samples or additional actions if an individual sample exceeds $15 \mu\text{g/L}$.</p>	<p>Find-and-Fix: If individual tap samples $> 15 \mu\text{g/L}$.</p> <ul style="list-style-type: none"> Find-and-fix steps: <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> Conduct WQP monitoring at or near the site $> 15 \mu\text{g/L}$. Perform needed corrective action. Document customer refusal or nonresponse after 2 attempts. Provide information to local public health officials.
<i>LSL Inventory and LSLR Plan</i>	
<p>Initial LSL Program Activities:</p> <ul style="list-style-type: none"> 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. 	<p>Initial LSL Program Activities:</p> <ul style="list-style-type: none"> 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 > 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.
- 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.

CURRENT LCR	FINAL REVISED LCRR
<p>LSL-Related Outreach:</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> ○ 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. 	<p>LSL-Related Outreach:</p> <ul style="list-style-type: none"> • Inform consumers annually that they are served by LSL or lead status unknown service line. • Systems subject to goal-based program must: <ul style="list-style-type: none"> ○ 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.
<i>Small System Flexibility</i>	
<p>No provisions for systems to elect an alternative treatment approach but sets specific requirements for CCT and LSLR.</p>	<p>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:</p> <ul style="list-style-type: none"> • Systems can choose CCT, LSLR, provision and maintenance of point-of-use devices; or replace all lead-bearing plumbing materials.

CURRENT LCR	FINAL REVISED LCRR
<i>Public Education and Outreach</i>	
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • CWSs must provide updated health effects language in all PE materials and the CCR. <ul style="list-style-type: none"> ○ 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: <ul style="list-style-type: none"> ○ Current PE requirements apply. ○ Systems must notify consumers of P90 > AL within 24 hours. • In addition, CWSs must: <ul style="list-style-type: none"> ○ 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. <p><i>Also see LSL-Related Outreach section of table.</i></p>
<i>Change in Source of Treatment</i>	
<p>Systems on a reduced tap monitoring schedule must obtain prior primacy agency approval before changing their source or treatment.</p>	<p>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.</p>
<i>Source Water Monitoring and Treatment</i>	
<ul style="list-style-type: none"> • Periodic source water monitoring is required for systems with: <ul style="list-style-type: none"> ○ Source water treatment; or ○ P90 > AL and no source water treatment. 	<ul style="list-style-type: none"> • Primacy Agencies can waive continued source water monitoring if the: <ul style="list-style-type: none"> ○ System has already conducted source water monitoring for a previous P90 > AL;

CURRENT LCR	FINAL REVISED LCRR
	<ul style="list-style-type: none"> ○ primacy agency has determined that source water treatment is not required; <i>and</i> ○ System has not added any new water sources.
<i>Lead in Drinking Water at Schools Child Care Facilities</i>	
<ul style="list-style-type: none"> ● 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. 	<ul style="list-style-type: none"> ● 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.
<i>Primacy Agency Reporting</i>	
<p>Primacy Agencies must report information to EPA that includes but is not limited to:</p> <ul style="list-style-type: none"> ● 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. 	<p>Expands current requirements to include:</p> <ul style="list-style-type: none"> ● 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.