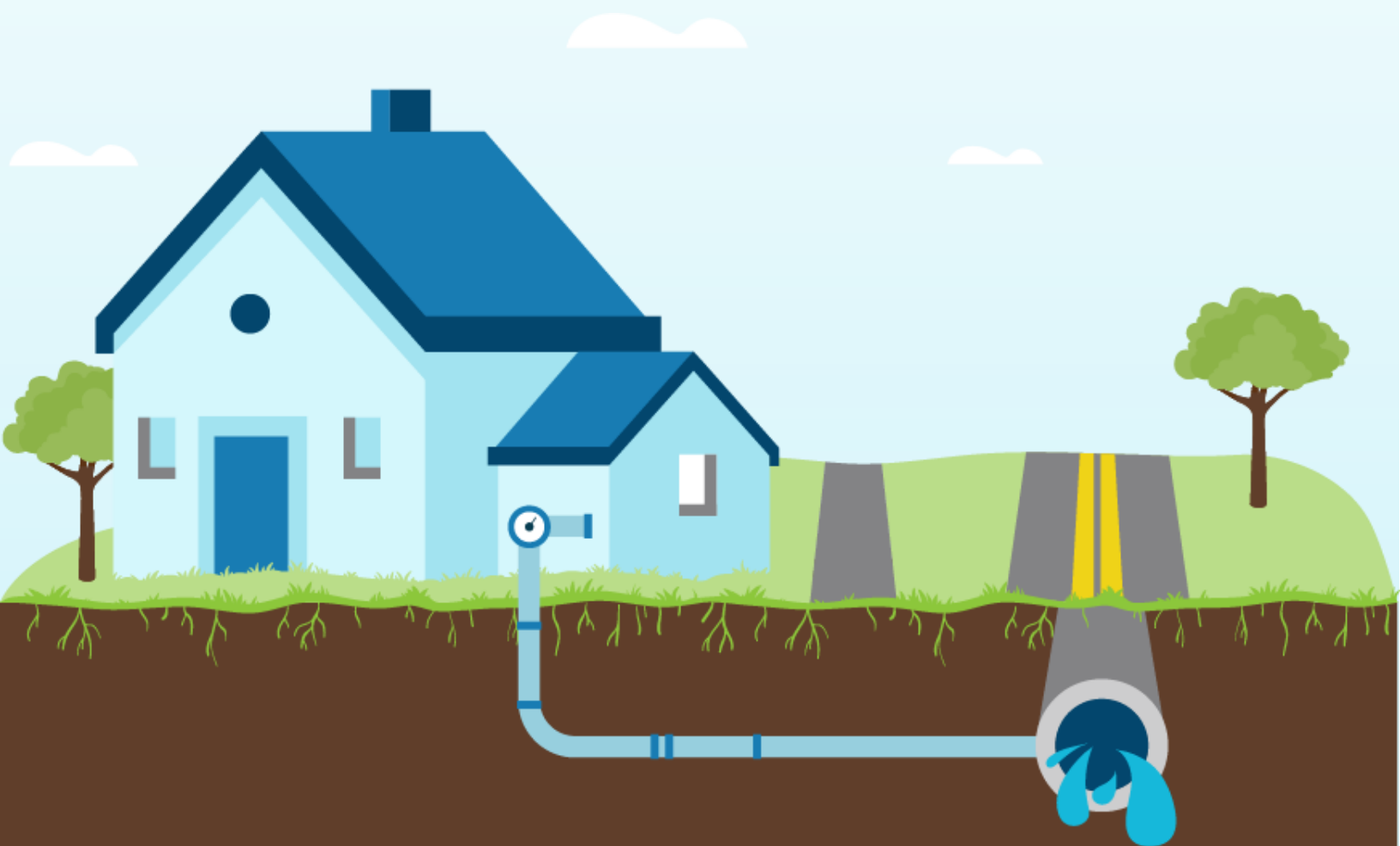


State Implementation Framework for the Lead Service Line Inventory Requirements under EPA's Lead and Copper Rule Revisions (LCRR)



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I. Purpose

On June 10, 2021, EPA published a [Federal Register notice](#) extending the effective date until December 16, 2021 and extended the compliance date to October 16, 2024.

The results of EPA's review and its decision were published in the [December 17, 2021 Federal Register](#). EPA determined that there are areas within the LCRR that can be improved with a focus on removing lead service lines and more equitably protecting public health. Therefore, while the EPA is allowing the rule to go into effect to support near-term actions, EPA will immediately begin developing a new proposed rulemaking to strengthen the elements identified within the notice. EPA intends this new rule, named the Lead and Copper Rule Improvements (LCRI), to be proposed and finalized ahead of the LCRR's October 16, 2024, compliance date.

Although EPA will be working on another iteration of the LCRR, EPA has made it clear that inventory requirements will remain, and that states and water systems should begin to develop their inventories. On November 15, 2021, President Biden signed [H.R. 3684](#), the "Infrastructure Investment and Jobs Act" (IIJA) an infrastructure bill that provides \$15 billion for planning, i.e., developing inventories, and replacing lead services lines. The significant amount of funding will increase the pressure to show results, i.e., locate and replace large numbers of lead service lines, in a timely manner. This inventory framework will assist in reaching that goal.

Inventories will have multiple uses for water systems and states. The focus of this framework is on compliance with the federal inventory requirements, which will be the first step in setting appropriate sample monitoring points and allocating money for lead service line replacement projects.

The purpose of this framework is to provide useful and consistent information to primacy agencies, water systems, and consultants to start the development of lead service line inventories while EPA develops inventory guidance. The intent of this framework is to serve as a prequel for EPA's Inventory Guidance and to ensure that everyone is working off the same information when starting inventories.

II. Preplanning for States

All community and non-transient non-community public water supply systems (PWS) must each comply with the LCRR requirement to develop an initial inventory “to identify the materials of service lines connected to the public water distribution system.” The LCRR that went into effect December 16 does not define a “service line,” however, the definition of “lead service line” is included: “*Lead service line* means a portion of pipe that is made of lead, which connects the water main to the building inlet. ...” The inventory must include all service lines connected to the PWS’ distribution system, regardless of ownership status. If the 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.

The system must identify all service lines, regardless of usage of the water (e.g., non-potable use such as fire suppression system), and active/emergency status of the service line. The service line could be repurposed in the future for a potable, active use.

The inventory is used in several parts of the rule, including to determine specific requirements on lead service line replacement, to conduct customer and property owner notification, and to select compliance tap sampling sites. The inventory is then periodically updated as service lines are replaced, new buildings added to the distribution system, “unknown” service line material is identified, etc. Finding existing information and then organizing that information is essential to developing and maintaining a successful inventory.

Non-potable service line location and identification will be a heavy lift for PWS. For the initial inventory, PWS should do the best they can but efforts to identify private potable LSL may be a better focus for resources. States may want to prioritize those service lines that change from non-potable to potable through policy and rule efforts provided these efforts meet primacy requirements.

Recommended reading: [Principles of Data Science for Lead Service Line Inventories and Replacement Programs, September 2020](#). This white paper was developed by BlueConduit for ASDWA and outlines the appropriate steps and logic for developing sound service line inventories.

Existing Federal and State Requirements for Basic Lead Service Line Inventory

Prior to the publication of the final LCRR, several state drinking water programs began developing inventories of service line composition in the community water systems (CWS) they regulated. Some states have already conducted voluntary or mandatory surveys of CWS whether on their own or in response to state legislation. Others are using the information obtained during the current Drinking Water Infrastructure Needs Survey and Assessments (DWINSA) required by EPA pursuant to Section 2015 of the America’s Water Infrastructure Act of 2018 as the basis of an overall picture of the state’s lead service line inventory.

The 2020 DWINSA requires an estimate of the number of public and private lead service lines in the systems involved with the survey, as well as an estimate of the costs to replace all lead service lines. The DWINSA data was required to be submitted by December 2021, however the LSL data submittal

date has been extended to February 2022. This is the first time the systems in most states have had to collect information on both public and private service lines. Based on information from states and systems, systems have more data on the public side than on the private side, and even then, the records have been incomplete or unavailable at some systems. The reported numbers for the 2020 DWINSA are aggregate for each system, and do not specify the material for specific service lines, but it is still a start down the path of developing the type of system-specific inventory required under the LCRR.

Information States Need to Determine and Disseminate Decisions

States will have to make several difficult decisions to implement the service line inventory requirement. Once made, these decisions will become a part of the training required for each system to successfully develop its initial service line inventory. The goal is to capture the necessary information at the outset, saving time and effort for both the system and state. Listed below are items and information for states to evaluate during decision making:

1. Determine the date the federal 1986 Lead Ban was adopted and became effective in the state.
 - a. Congress enacted the SDWA Amendments of 1986 (Public Law 99-339) on June 9, 1986. It prohibited the use of pipe, solder, or flux in PWS that was not “lead-free,” which was defined as containing not more than 0.2 percent lead in solders and flux, and that pipes and pipe fittings could not contain more than 8.0 percent lead. The prohibition was effective on June 19, 1986.
 - b. States had until June 19, 1988, to enforce the Lead Ban provisions, although a state may have had different dates when the law was codified, and the state began enforcement of the lead-free requirements.
 - c. Determine whether the state enacted a different, earlier lead ban, including date, and its definition of lead-free. This could typically be found in the state plumbing code archive.
2. Decide what, if any, data elements beyond those that are required by EPA for the LCRR must be included in an acceptable inventory, and what additional information will be collected for rule implementation, e.g., standard monitoring plan (SMP) locations, or funding qualifiers.
 - a. LSL inventory requirements can be found in §141.84 of the final LCRR published in the [January 15, 2021, Federal Register](#).
 - b. ASDWA has developed a template for the inventory, with elements that are required per the rule, plus suggested elements that may be included in asset management, in determining the standard monitoring plan sampling sites, in later customer notification efforts of lead-line or unknown sites, and with service line replacement funding. The template was developed using existing templates from four states (WI, MN, MI, KS), plus requirements in the final LCRR.
 - c. Determining what is required by the state in each of the categories is critical to ensuring that each system knows and understands the state’s expectations at the outset. An example is the locational identifier, which would commonly be the street address in a town or the 911 address in rural areas. The state must decide if another unique identifier may be used, and how that will inform the other program elements (public dissemination of the inventory, customer notification at buildings with LSLR/galvanized requiring replacement (GRR), compliance sampling site identification, identification in the state’s database, etc.).
 - d. In the DWINSA, participating systems included lead connectors, pigtails, and goosenecks in their summary of service line materials. In the LCRR, lead connectors, pigtails, and goosenecks are not included in the lead service line definition. The ASDWA template has included a column for those lead components since it is more efficient to capture the available information during the inventory than requesting it later.

3. Standardize the required data elements for system training and reporting purposes.
 - a. Is a map required or recommended? If required, what type of map is sufficient?
 - b. Required identification scheme for service line: street address, unique identifier, etc.
 - c. Define terms used in the inventory template.
4. Decide the minimum data maintenance elements a PWS must have to submit a valid inventory.
 - a. Electronic system capable of tracking by service line by location (e.g., house address)
 - b. Clear data field titles with definitions
 - c. Database should be easily updated
5. Decide the verification requirements that the system must meet to have a valid inventory. States may want to consider setting criteria for a “high,” “medium,” or “low” degree of confidence with the inventory. This could be incorporated into, or part of the matrix noted below in Understanding the Existing Data and Quality.
 - a. Onsite verification (e.g., viewing service line entry into building)?
 - b. Potholing or digging a certain percentage of service lines to determine composition in an area?
 - c. Historic data?
 - d. Modeling and/or machine learning software use?
 - e. Combinations of these methodologies?
6. Decide on the required mechanism to submit the initial inventory and ongoing updates to state electronically using a spreadsheet or portal/database, pdf, paper, other. From states that have required inventories in the past several years, the electronic submittal (Excel spreadsheet, database portal) is much preferable to a paper or pdf submittal, which is only a snapshot in time.

In many states, providing technical assistance to the PWS, and conducting the reviews and approvals for the development and implementation of LSL inventories will be a resource intensive project. Reporting through an online portal and delivering content via a website may pose significant barriers to some states, particularly when IT and computer services are centralized within the state. The California Water Board used a small committee of employees from the drinking water program, GIS team, and electronic annual report team and estimates over the two years of development and implementation that they have spent 1800 to 2700 hours of staff time, or the equivalent of 1.0 to 1.5 full-time employee (FTE) annual hours on their LSL inventory over about 2 years.

7. The LCRR will result in a significant increase in workload at the state level. State should develop an estimate of the resources needed for the following areas related to the inventory:
 - a. Develop the state-specific inventory requirements.
 - b. Instruct and train the public water supply systems (PWS, specifically community and non-transient non-community systems for the LCRR) on the inventory requirements, including submittal to the state.
 - c. Review the submitted inventories.
 - d. Determine PWS compliance with the inventory requirements.
 - e. Timeliness: submitted on-time.

- f. Completion: full inventory or partially completed inventory.
 - g. Content: did the content meet the required elements?
 - h. Include criteria for every type of potential NOV, including RTC, PN, and reporting to EPA (including codes).
 - i. Effort needed to encourage compliance by systems missing deadlines and take enforcement action if it becomes necessary.
 - j. Development and ongoing maintenance of state data platforms (database codes required).
 - k. Receipt of the periodic inventory updates from all systems with service lines comprised of unknown materials or lead service lines.
 - l. Receipt of any periodic certification that a system continues to be “non-lead” in regard to its service lines.
8. Decide on the approval/acceptance process for the eventual satisfactory completion of the inventory update.
 9. Are there any state statutes that pertain to the release of property information to the public that could affect the inventory process? Determine if there are any legal issues that need to be considered.
 10. Decide how the inventory will be made available to the public, whether through summary reports for each system, individual inventories for each system, or some other method. States already requiring these reports, such as [Michigan](#) and [Illinois](#), recommend an option to download all reports submitted in a single file and the capability to readily generate summary reports for media or public inquiries.

Information at the PWS

The PWS must develop the initial inventory of all service lines in its distribution system. Obtaining the historical information from several sources will aid in the development of an accurate inventory. Listed below are items and information for the PWS to review for the initial inventory:

1. Determine ownership of the service lines in the PWS: entire line public (PWS), entire line private (customer), or combination.
2. Determine if there is any ordinance that prohibits reburial of exposed lead lines, and its effective date.
3. Determine if there was a date or timeframe after which lead pipes in the system were no longer used.
4. System tap cards, which have significant information. Determine if they are available and have been maintained over time. The card typically has the meter replacement date, is listed by address or another unique identifier, and may list building usage (single-family residence, multi-family residence, K-12 school, child daycare, or business).
5. Private side records, if applicable, such as a permitting process or other process where records were returned to the PWS of work done on the private side of the service line.
6. Water main construction and replacement records, including dates of current water mains. Examples: In specific replacement projects were the service lines wholly replaced, partially replaced, or is that not known? Was there a standard practice of replacing the entire service line when a main was replaced? Are there any standard operating practices that would reliably inform service line composition? Would a newly constructed building be connected to an existing service line?
7. Review capital improvement projects over the years to determine if certain areas had work done that affected the service lines.

8. Data from the 1991 Lead and Copper Rule (LCR):
 - a. Review the lead tap sampling data under LCR since 1991, to evaluate which areas have had elevated lead levels.
 - b. Review the initial LCR Materials Inventory and any updates, which may indicate areas with lead service lines or areas where service lines were replaced.
 - c. Any other distribution system inspection records or studies, such as leak studies, which may have reviewed service line composition.
9. Consider the requirement to maintain and update the inventory over time, to identify unknown lines, and to remove LSLs and GRR lines. This is a process that will be ongoing for quite some time for many systems.
10. Develop a plan to address the “unknown” service lines, which would include public communications with building owners and occupants.

Other Information Sources for PWS to Use

Potentially useful information can be obtained from specific city government departments related to building construction, which is not typically held within the PWS records.

1. Tax assessor records for each property.
2. Timeframe of building construction and when taps were made.
3. Building codes and plumbing codes in use during those timeframes.
 - a. Typical plumbing materials and practices.
 - b. Accuracy of information.

Methods to obtain information on private side service lines, if applicable:

1. Provide instruction materials and questionnaire for the occupant on how to access the service line entry point into the building and determine the service line composition. Several reference materials have already been developed which are listed under the Resources section.
 - a. Is the questionnaire/survey enough?
 - b. Will a photo be required? Can the PWS receive it via text and/or email?
 - c. Onsite inspection inside building by knowledgeable person.
2. Meet with local, active, and retired plumbers and water supply operators to discuss what has been found in the past 40-50 years, and in what areas of the system.
3. Sequential sampling of the service line may be used to determine composition through lead results when visual inspection is not feasible. It may not work to determine “no lead” because of corrosion control films on pipe interior, but this method could be used to determine LSL or GRR if lead is detected prior to the tap.

State Questionnaire to CWS and NTNC

To obtain an overall picture of a state’s systems, a short questionnaire could be sent to all CWS and NTNC to determine their status at this point in time (i.e., February 2022). The questionnaire could be done in an electronic manner such as Survey Monkey, and include these items:

- Notification of requirement of the PWS to conduct an inventory of all service lines.
- Minimum required elements of inventory.
- Ownership of service lines in that system (public/private/combo).
- Estimates of LSL, galvanized, unknown service lines in that system.

- Estimate of confidence the system has in its data (somewhere on the spectrum of complete and thorough records to no records).
- Contact person for LSL inventory at PWS and contact information.
- Description of process and requirements for LSLR and GRR funding if that is available.

Resources

Many good examples of strategies, webpages, and resources have been developed by systems and states over the past few years. Some of them are provided here:

Example of road map to LSLR:

[Lead Service Line Replacement \(LSLR\) Collaborative's Road Map to LSLR
www.lslr-collaborative.org/roadmap.html](http://www.lslr-collaborative.org/roadmap.html)

Example of a map and how to identify SL material:

[Greater Cincinnati \(OH\) Water Works webpage
www.cincinnati-oh.gov/water/](http://www.cincinnati-oh.gov/water/)

Example of how to identify SL material:

[LSLR Collaborative's Identifying Service Line Material
www.lslr-collaborative.org/identifying-service-line-material.html](http://www.lslr-collaborative.org/identifying-service-line-material.html)

Example of how to identify SL material:

[Madison \(WI\) Water Utility's Identifying a Lead Service Line
www.ldh.la.gov/assets/oph/Center-EH/engineering/LCR/Lead_Pipe_Identification.pdf#:~:text=How%20to%20Identify%20a%20Lead%20Water%20Service%20Line,on%20the%20pipe%20after%20the%20point%20of%20entry.](http://www.ldh.la.gov/assets/oph/Center-EH/engineering/LCR/Lead_Pipe_Identification.pdf#:~:text=How%20to%20Identify%20a%20Lead%20Water%20Service%20Line,on%20the%20pipe%20after%20the%20point%20of%20entry.)

Example of preparing a SL inventory:

[LSLR Collaborative's Preparing a Service Line Inventory
www.lslr-collaborative.org/preparing-an-inventory.html](http://www.lslr-collaborative.org/preparing-an-inventory.html)

Example of system SL inventory with verification:

[Michigan EGLE Distribution System Materials Inventory \(includes verification\)
www.michigan.gov/documents/egle/egle-complete-distribution-system-materials-inventory-overview_720142_7.pdf](http://www.michigan.gov/documents/egle/egle-complete-distribution-system-materials-inventory-overview_720142_7.pdf)

Example of system LSLR program:

[Madison \(WI\) Water Utility's Lead Service Line Replacement Program
www.cityofmadison.com/water/water-quality/water-quality-testing/lead-copper-in-water](http://www.cityofmadison.com/water/water-quality/water-quality-testing/lead-copper-in-water)

Example of system's interactive public map:

[Ames \(IA\) Water Treatment Plant's Interactive GIS LSL Map
www.countyoffice.org/ames-ia-gis-maps/](http://www.countyoffice.org/ames-ia-gis-maps/)

Example of a system's full-service LSL website:

[Greater Cincinnati \(OH\) Water Works Lead Homepage
www.la.mygcww.org/](http://www.la.mygcww.org/)

Example of a state funding program for LSLR:

[Wisconsin DNR's Private Lead Service Line Replacement Funding Program
www.dnr.wisconsin.gov/aid/documents/EIF/privateLSLreplacementFundingProgram.html](http://www.dnr.wisconsin.gov/aid/documents/EIF/privateLSLreplacementFundingProgram.html)

III. Developing the Inventory

Communication

The state must communicate the LCRR inventory requirements with its regulated water systems and also with the public at large, since this is a significant effort that will generate substantial discussion. The more information that can be provided at the outset in a clear, concise manner, the fewer questions will be generated that will require additional effort to answer. Note that there are other required LCRR communications in the form of several types of consumer notices, public notice, consumer confidence report, and public education, which are not addressed in this framework.

The state's public information staff may be used to disseminate information from the public water supply program and would be especially appropriate in general public information announcements and development of public information materials. An example of a state website that lists the aggregate inventory numbers for each system is [Illinois EPA's Lead Service Line Information webpage](#).

The other state and local agencies that work in the same areas of public health and water supply must also be informed of the requirements, yet not in as specific a detail as is provided to the system.

In states with a separate infrastructure funding agency, that agency will need to be aware of the state efforts regarding inventory and lead service line replacement since those existing state mechanisms will be used to distribute any federal funding.

Local (county and city) boards of health should be made aware of the inventory requirements since the inventories and replacement programs will ultimately be topics of discussion within each community and will need to be put into context with other local programs. The school and childcare center testing program under the WIIN Act using the 3Ts program has begun in most states, and the department that is running

States have different approaches to gaining primacy. Some states reference the federal rule in its rules while other states adopt rules. In either case, the federal rule often needs clarification on state discretion items or in areas where the federal rule is not definitive. Early implementation requirements are confounding for states as they do not have the time to require submissions with the detail/clarification desired. Lead service line inventories fit into this category. States may find it difficult to get the detailed information on the first go around. This can be frustrating when states are trying to minimize touchpoints with the public water systems. They end up going back again and again for more information for various parts of the rule.

To the extent possible, states should design the goal for an ultimate inventory, i.e., what is wanted after iterations of the inventory, and use that goal to build the initial inventory and future revisions, as needed. For example, a state may want to develop a mapped inventory, but can only start with a spreadsheet. Ensuring the spreadsheet requires consistent data elements, nomenclature, and formatting will allow the state to save the information in a way that will convert into a map in the future. As states prepare for the inventory early implementation requirements, discussions with their attorneys, technical assistance providers, other state and local programs, the public and public water systems may assist in building a better inventory even if the rules or policies are not adopted by the time the inventory is due.

that effort should be made aware of the LCRR inventory efforts, as it will be easy to mistakenly conflate the two different programs.

The water system must communicate with its customers and consumers about the inventory since there will be “unknowns” in most systems. They must ask for information in a manner that will yield useful results, and in a way the water system is able to receive it. The water system will need to conduct a public outreach and engagement effort, especially if it has a large number of “unknowns.” Over the past several years, a number of cities have taken on the challenge of identifying and removing all the lead service lines in their system. On their websites, Cincinnati, OH, Madison, WI, Ames, IA, Flint, MI, and St. Paul, MN outline their LSL removal efforts; these websites can serve as a model for communicating LSL removal efforts.

In addition, the service line materials inventory must be publicly accessible from all water systems, including a locational identifier such as a street address for each lead service line or galvanized requiring replacement. The water system may include the “unknowns” on the inventory, as well as those with other material types of service lines. Water systems serving more than 50,000 people must make the inventory available online. Each community system must include instructions in its consumer confidence report on how to access its service line inventory.

The water system will also have to communicate regularly (at least annually) with the people in those homes with lead service lines, galvanized requiring replacement, or “unknowns,” as described under the public notification portion of the LCRR.

Contents of the Inventory

Any elements of the inventory, beyond the minimum requirements under the LCRR, need to be decided by the state. This framework recommends incorporating other similar information requests of the water systems in the inventory. This framework should assist in justification for those additional data elements.

The state will need to provide information and examples to the water systems of what it considers to be an acceptable inventory. Available resources for inventories and descriptions of the components should be used to develop a successful inventory. A few examples are:

- [Lead Service Line Replacement Collaborative \(LSLR Collaborative\)](#)
- [ASDWA Templates for CWS and NTNC systems](#)
- States which already require an inventory, and their templates: WI, MI, KS, MN

Technical assistance providers may be able to assist water systems in developing the inventories. For example, Ohio used RCAP to develop the first round of state-required lead maps on a voluntary basis, and the maps that RCAP developed were some of the better maps for the smaller systems. If technical assistance providers will be used, the state needs to ensure technical assistance providers understand the minimum requirements. Technical assistance providers may be more effective in convincing water systems to improve data quality.

The state needs to decide how much information it needs from the water system. The states' communication plan to the systems should be clear on what this inventory will include and what other required data elements will be collected under additional submissions to the state. This framework's template is intended to give states a starting point. States may add or remove areas to fit their needs.

Classes like the DBP IDSE could be used or an AWOP approach where water systems bring their information. The state or technical assistance providers can help the water systems with their information. It may be multiple classes or just one section of the distribution to start water systems on the right path.

Minimum Elements for Primacy Requirements

Per 141.84 as promulgated in January 2021, the LCRR requires an inventory on lead, galvanized steel, and unknowns using the information noted in Section 3 (Information at the water system) on the entire service line from the main to the building inlet, regardless of ownership. Specifically:

141.84 (a)(4)(i-iii) Each portion of the service line (if ownership is split) must be identified as:

1. Lead
2. Galvanized requiring replacement
3. Non-lead – (evidence-based)
4. Unknown

142.15(c)(4)(iii)(D) requires each PWS to report separately the number of each of the above in its distribution system.

The LCRR only requires PWS perform a record review (including plumbing codes and other regulatory considerations) for the initial inventory. States are required to review the submissions for compliance with the rule. Non-lead designations must be evidence-based. States may want water systems to submit the evidence used and attest to the non-lead areas of the distribution. The state may want to do a cursory review of historical lead sampling data. Lead sampling could reinforce the designation or require more documentation from the water system. For unknowns, the LCRR sets an expectation that the primacy agency will require the water system to do further investigation of the materials. The rule leaves this up to the primacy agency to determine. The rule requires water systems to identify and track service line materials during normal operations (141.84 (a)(5)) but does not set requirements for eliminating unknowns from the inventory. The rule presumes there will be lead service line replacements and service line inspections (141.84(a)(6)) but does not outright require the water system to complete any specified number or percentage. This may change under the Lead and Copper Rule Improvements.

Additional Information Requests

An expanded inventory may be necessary for states. Other LCRR requirements or minimizing additional water system data submissions may result in the state expanding the inventory information. All systems will need the inventory basics, such as site location and type of service line material(s) of the entire line from the main to the building. However, there are other items that would be very useful for the state to capture at the same time the system is reviewing records and developing its inventory. These items include the date of service line installation, the tier criteria required as part of the sampling plan (see the Sample Monitoring Considerations section), historical reference from LCR sampling sites to LCRR to have continuity in corrosion control optimization, type of building (single and multi-family

residences, business, school/childcare), presence of onsite treatment (point-of-use or point-of-entry), and whether the service line at that specific location is eligible for funding assistance for replacement. The template suggests categories for information requests, however some categories cross over. For example, in identifying the building type, schools and day cares may be eligible for additional funding and not just a sampling site consideration.

Additional items that a state could consider including in their inventory may pertain to that state's rules or practices, such as whether the abandoned service line may remain in the ground or is required to be removed if it contains lead. There may be other items that a system would like to include in their inventory as part of their record maintenance (e.g., service line diameter), meter age (pre-1986, between 1986-2014, post-2014), interior building plumbing (if the site is investigated as part of a "find-and-fix" effort), or other parts of their asset management program. Limiting the number of times the state must ask the system for information will be most resource-efficient for both the state and the system, so it is beneficial to think broadly about data needs at the outset.

Sample Monitoring Considerations

In EPA's [December 17, 2021 Federal Register notice](#) regarding the next steps for the LCRR, EPA noted multiple areas that may be revised under the LCRI. One of these areas is compliance tap sampling. As the final sampling requirements are yet unknown and the rule is in flux, information included in this framework regarding tap sampling is based on the LCRR as promulgated in January 2021.

If a water system has LSLs, GRR or lead solder, unknown sites may not be used as sampling sites. It is critical the state have the information in the inventory to ensure water systems are complying with the five tier categories. Water systems may not move to the next Tier unless there are not enough sites. Citation 141.90 specifically requires the sample monitoring points be identified from the inventory and if there are not enough higher tiered sites, then document the reasons why. The inventory is documentation of the distribution system and should show where various tier sites are located. The inventory must be re-submitted within 30 days of the end of the sample monitoring period to include lead service line replacement certifications and other connector replacements that were completed and not yet reported on the inventory. All this information impacts the state's ability to determine compliance with lead and copper sampling requirements.

Note - If a system has a majority of unknowns, the sample monitoring plan will be more complicated per the LCRR promulgated in January 2021. The PWS is required to provide explanation and justification that the sites are representative of the distribution and are of common plumbing material. Sites must be single or multi-family homes. Non-residential sites must be a last resort. As unknowns are identified, some sample monitoring points may change with every monitoring cycle. Incorporating identified unknowns may change with the October 2024 rule changes.

Per the LCRR promulgated in January 2021, systems on semi-annual sampling would only be required to update the inventory once per year. Only one of the six-month monitoring periods would require an updated inventory within 30 days of the end of the monitoring period.

Understanding the Existing Data and Quality

Based on states that have already required inventory updates (MI, WI and OH), the initial inventory will be rudimentary in many cases. Setting realistic expectations of the initial inventory is important so the state can position itself for the next phase of improving the inventory.

States should consider requiring water systems to categorize their level of confidence with each inventory update. Something as simple as High, Medium, Low can be a method to show progress over time. If the state is requiring a stepwise approach to eliminating unknowns and verifying the material inventory, each progression should improve the confidence.

The state can take all the information received, including any pre-surveys, and gauge its level of confidence with the inventory. A simple matrix that considers things such as records the water system used to develop the inventory, the number of unknowns, how much consumer data is used, sampling data, maturity of the water system's LSL replacement program, etc., can help categorize the water system's inventory. By investing the resources into qualifying the inventories, states can respond to events that may call the data quality into question such as trigger levels or ALEs, media attention, etc. Pooling resources to help the water system improve confidence is important. Water systems with a high level of confidence could assist other water systems. Technical assistance providers could assist the systems with the "low" levels of confidence. Funding assistance may be available to pay for some of the more advanced or progressed degree of eliminating unknowns.

States also need to consider the reliability of customer-provided data. This information can be helpful and can assist water systems with resource demands. Tools to help customers should accompany any customer identification. This may trigger water systems to do an on-site visual inspection. Below are some tools for water systems and customers to use that may improve data customers generate.

- I. Videos, for example, Cleveland, OH - https://www.youtube.com/watch?v=AiU7GHZD_Ck
- II. Website information, for example, Cincinnati, OH - <https://la.mygcww.org/do-i-have-a-lead-service-line/>
- III. System email addresses or picture portals for consumers to submit service line photos that could be verified by the system if needed in the future, for example, Washington, DC - <https://www.dcwwater.com/sites/default/files/lead%20pipe%20material%20info%20sheet%2003172020.pdf>

Compliance with the Inventory requirements

The minimum compliance requirement for water systems will be to submit their inventory to the state and have it publicly available to their consumers by October 16, 2024. The LCRR requires states to describe their inventory review process for primacy, but it does not specify minimum primacy requirements on states assessing completeness and thoroughness of this information. Any non-lead service line determination must be evidence-based. This implies a record exists definitively noting it as non-lead. At a minimum, states should consider a certification or other means of the evidence-based information used. States may want to consider specifying what constitutes legitimate evidence. For example, guidance does recommend water systems interview previous operators; however, as previous operators may not be available or willing to help, the state may want to require another form of evidence beyond recollections of prior operators. States should set these expectations with the roll out of the inventory and incorporate them into water system training.

The states must decide what criteria they will accept for the quality of the content and completeness of the inventory. These items will need to be tracked for compliance purposes initially, as well as over time to track inventory improvements. The goal is for all systems to have complete inventories of each entire service line, preferably including their location.

The database used by the state must include the compliance component at least at a basic level, since this is a multi-year effort, with many compliance points related to the inventory.

Updates to the Inventory

A system must continue to refine its inventory until the following three criteria have been met for all service lines, for the complete length of the line: (1) all “unknown service line material” has been identified; (2) all lead lines have been replaced; and (3) all galvanized lines requiring replacement have been replaced. Only when those three criteria have been met will the system be permitted to stop submitting an updated inventory.

The PWS would be required to certify it meets the criteria (See Non-Lead Certification section) and should also include documentation on how the systems will handle any unexpected LSL or GRR that may be identified over time, including notification to the state. The system is required to submit an updated inventory to the state within 30 days of identification of a service line requiring replacement. The system should also explain how it made the determination of the service line materials as part of the certification. In other words, did the system conduct acceptable due diligence in its investigation and inventory development?

After the initial records review, the system is required by rule to update the inventory by identifying and tracking service line materials in its inventory as the lines are encountered during normal operations, such as performing maintenance and repair activities, and checking service line materials when reading water meters.

The state must decide how and when it will receive the updated inventory from each system. Updates through a portal, a revised spreadsheet, or paper copies are all options that should be considered. The compliance with each submittal must also be determined: was it submitted timely, was it acceptable in content, had enough gains in removing LSLs or GRR been made (where required)? The water system is required to maintain the publicly accessible inventory and include any updates to it, on at least the same schedule as the updated inventory is submitted to the state.

Whenever there is a requirement, tracking will be needed to demonstrate compliance and to support any enforcement actions that eventually may be necessary. Once service line replacement begins or “unknown” lines are identified, the updated inventory may affect the next round of tap sampling plans through changes in the service line tier classification (See Sample Monitoring Considerations). Some systems that have already begun a thorough process of identifying service lines have reported that additional lead lines have been found than what the historical records indicated, which has affected the inventory and sampling plans.

The system must be able to keep its customers informed, and so is encouraged to keep a real-time inventory, where the update is made when the service line is identified or replaced. This real-time update, though, would be very difficult to manage at the state level from a resource perspective and is not needed. The updated inventory must be submitted to the state within 30 days of the end of each compliance tap sampling monitoring period, and no more frequently than once per year.

Within the state program, there are typically several staff that must remain abreast of the inventory status: compliance (sampling plans, monitoring locations, schedules, and public/consumer notifications), engineering (corrosion control, LSLR projects), field service (inspection of treatment facilities, onsite distribution inspection) and, in some states, state laboratory (monitoring). All should have access to, and understand, the inventory update process and database.

Non-Lead Certifications

At some point, either initially or after efforts to confirm unknowns are not lead and LSL and GRR replacements are complete, the water system can demonstrate a non-lead distribution system in writing. The state will have to assess the submission of non-lead requests. Some type of certification for systems to eliminate inventory requirements for the water system is recommended.

The rule requires the non-lead submission be in writing. The PWS must base the non-lead determination on an evidence-based record review. The state will have to determine how it reviews this demonstration. The state should consider requiring some verification/attestation by the water system that there is no lead and a description of the evidence on which the designation was based. The state may consider eliminating the possibility of an initial non-lead certification if tap results are above a certain level. Plumbing may be the factor in lead detections, but the state should consider some additional level of demonstration that there is no lead in the distribution before accepting a non-lead certification. Alternatively, a state should feel more comfortable accepting a non-lead certification if there are no lead detections and the records show distribution installation after the state's effective date of the June 19, 1986, Lead Ban.

Refining the Inventory

As noted in the section above, the water system must update the inventory on an ongoing basis, as the service line materials are identified, replacements are made, etc. When will the water system have a complete inventory acceptable to the state? One state has used a statistical analysis (MI) to determine if sufficient progress is being made on the inventory.

The LCRR requires a records review for the initial inventory; and inventory updates made when service lines are replaced, or "unknown" service line materials are identified through routine maintenance, repair, replacement, meter-reading processes, and inspections.

The rule requires demonstration by records or physical examination to change from unknown to non-lead. There is an increased expectation of verification to denote non-lead.

States need to work with stakeholders and set requirements for clarifying unknowns and improving the inventory. Based on the escalation of complexity and cost, states may recommend a stepwise approach.

[This was also presented on August 25, 2021, Region 4 Lead and Copper Rule Workgroup Monthly Meeting:](#)

Considerations for material identification¹ beyond verification of plumbing codes, permits and water system records include:

1. Basic/Visual - PWS does an onsite inspection of the plumbing as it enters the building (during meter reading, as a special effort, or through requests of photos from building occupants).
2. Sampling
 - a. Tap/Sequential - Sequential sampling when the interior entry to the building inspection is not possible (finished basement walls, for example); sample the first and fifth liter of water after a stagnation stand time to determine if the lead level increases between the two draws. Note: If the results between the two do not change, or are non-detect, it does not mean the line is non-lead, since there could be corrosion control processes that have

¹ USEPA provided a stepwise approach with considerations of each step in the AWWA Water Science Article, Lead Service Line Identification: A Review of Strategies and Approaches. Hensley et al. April 2021.

- deposited a protective film inside the lead line. If the lead level in the fifth liter is greater than the first liter, it can be assumed that the line contains lead. If the lead level in the first liter is higher than the fifth liter, it can be assumed that there is lead-containing material in the home plumbing (e.g., a brass faucet).
- b. Targeted/Flushed
 3. Mechanical Excavation
 - a. Full
 - b. Vacuum Excavation/Potholing
 4. Predictive - Modeling/Machine learning.
 5. Some combination of these for complex systems.
 6. Alternative methods – electrical resistance acoustic wave, eddy current, other technologies that may be developed.

Water systems should develop their own escalation process of identifying unknowns and improving the inventory. States can consider the water systems' approaches to identifying unknowns, similar to plans for distribution changes or construction. This is a resource burden for the state to review alternative approaches, but one size is likely not to fit all. It would be recommended to provide some "default" approach for some water systems, such as the escalated efforts noted above.

While clarifying unknowns and improving the inventory are often intermixed, they are not one and the same. The fewer unknowns, the better the inventory, but even systems with few unknowns need to improve the confidence and degree of specificity in their inventory. Improving the inventory is the umbrella task which is likely to have fewer state-specified steps or criteria. However, states should consider requiring a documented approach or process to change an unknown SL to non-lead SL. Specific records should accompany or be available in accepting the change.

Setting improvement standards

States need to develop requirements that increase the inventory's specificity and reliability. The LCRR specifically leaves that to the state. As previously noted, there could be a stepwise approach as a default. States may want to set a percentage of the distribution or unknowns that will be clarified each year or concentrate on the oldest or least documented areas of the distribution system. Requirements should allow for future developments as technology improves. States may set a staggered or delayed approach to certain PWS or areas of the distribution system that could wait for new, less expensive technologies to emerge. This can be done in conjunction with decisions states are making with a water system that triggers a LSLR. Water systems under LSLR should anticipate having more frequent inventory updates or higher percentages of the inventory confirmed than other water systems.

In conjunction with the stepwise approach to build the materials inventory, an assessment of the quality of the distribution records should be maintained by the water system. Federal or state-funded replacement programs should consider including an assessment of distribution records as a condition of the funding. Review and consideration of the following can feed into the improvement of the records.

1. Compliance sampling history: look at analytical data from previous sampling events to determine areas with lead lines, and whether an individual line is lead-containing. Example: a location with elevated lead prior to the installation of corrosion control treatment would still be lead if the service line had not been replaced in the intervening years.
2. Inspections during routine activities such as line repairs or water meter replacements, as required by 141.84(a)(5). Other inspections could include complaints or water quality customer visits, etc. It is important for water systems to verify all information, even if records exist. This assists in building confidence with existing records and any predictive modeling the water system may use.
 - a. Include “find-and-fix” records in the assessment once the rule is in effect.
 - b. Very small systems, such as a homeowner’s association, may use in-home meter reading to visually inspect the service line as it enters the building.
3. Record findings of actual material identification during lead service line replacement projects.
4. Dedicate resources to reviewing record accuracy and increasing predictive capabilities.
5. Provide incentives such as:
 - a. Money allowances to gain access from property owners such as credits on water bills or gift cards;
 - b. Discussion of the funding possibilities for the LSLR and GRR, stressing the limited availability of the “free money;”
 - c. Incorporating the LSLR and GRR as part of a larger water main project in a specific area that has a high concentration of those types of service lines; or
 - d. Promotion of water quality improvement including better pressure through new pipes, along with photos of the interior of corroded galvanized pipes as the “ick” factor.

States may want the water system to provide an explanation or assessment of record accuracy as part of the inventory updates or also may review records during on-site activities.

IV. Data Utilization

Some components of the inventory will have SDWIS applications but will not be enough for the state to routinely track progress and determine compliance with the inventory and the ancillary programs it impacts. Before the first inventory is submitted, the state will need to have its tracking system in place and have it accessible to impacted programs. As noted above, compliance staff, funding staff, and others will need access to the data.

Will the water systems be able to update the inventory as they make changes, or will the state set some routine reporting deadlines? The rule requires submission after each monitoring period but no more frequently than annually. The state may allow some more frequent submission, but this may be a burden to the state. Once the water system submits the data, the state will have to decide how transparent to make the data. Some amount of reporting out internally will occur and may even be provided externally.

Accessibility should be considered outside the drinking water program. Other state and local programs may benefit from access to the data or data summaries, but it needs to be interpreted correctly. A similar approach for public access should be considered. The accessibility and the way data can be accessed should be included in the communication plan as noted above. Will actual data be accessible, or will routine reports be made available? The state will need to decide and include these expectations with its communications to all stakeholders. As noted in Section III, states will need to consider who needs information and how will they access it as they build their data management strategy.

Similar considerations must be given to the public. Will the public have readily available information at the state level, or will the state defer to water systems? Water systems are required to give their customers access to their inventory and systems greater than 50,000 must have it available online. The state will have to ensure these requirements are being met. As the state plans for a compliance program to ensure water systems provide the required information to the public, it should also consider how it may be able to make that information publicly accessible. Public requests are going to come to the state from consumers, environmental groups, realtors, etc. The state may consider making a publicly available website a part of the compliance effort. It may provide more transparency and a co-regulatory approach if the state builds a compliance program that provides information to the public. For example, the state may want to consider a portal or another way for the water systems to upload required information. This information can then be provided in some form to the public and provide additional access points at the water system. Eventually, it could save the state resources to anticipate the requests to have the data available online. It may still defer to the water systems site but can be referenced on the state site.

Will the public have a way to report information at the state level? The state and the water systems should develop a process that the public will use when they choose to contact the state instead of the water system. A more specific concern should be complaints by customers such as filters not being provided, incorrect information for their service line, failure of the water system to replace the public side in a timely manner, etc. This rule has a lot of public information points, and the state should consider setting up a complaint response process. The state may be able to modify their existing complaint process to specifically address public LSL concerns. Consideration of these items should be done before developing the platform(s) for data management.

The state should develop an end goal for the data. Mapping is useful for stakeholders. If the state has this goal, there are multiple tools, and the state may need to seek outside contracts. Discussions about

this should be occurring now. ESRI, Google maps, and other asset management tools may work for the state and water system needs. Even if the ultimate platform will not be available for the initial inventory, ensure that data is collected in such a manner that it can be converted later. This includes mandatory nomenclature and specific submissions. The water system can submit the data in something like Excel and the state can convert that to another platform using a delimited format.

If funding is available for inventory development, states should consider setting requirements for how that data is captured as a condition for receiving funds. They should begin those discussions with the funding program early so all stakeholders can get the information needed from the water systems' inventories.

Non-lead demonstrations/certifications will need to be determined with each inventory update. The state will need to note in its database which systems do not need to maintain inventories any longer, either with an initial non-lead certification or if it is attained later. The state may want to consider how this information is displayed publicly. This can eliminate confusion with water systems that failed to do the inventory and are in violation versus water systems not required to do the inventory.

V. Outcomes

As noted, the LCRR requires an inventory that is completed via record review. Unless a LSLR is triggered, unknowns are not required to be identified. While this is the only federal requirement, states will need to decide what outcomes they want to achieve.

Elimination of all LSLs is a desired outcome nationwide. Aside from the public health outcome, removing all LSLs and identifying all unknowns with a high degree of confidence makes compliance with other portions of this rule much easier. The state needs to develop a stepwise approach to reach these outcomes before the initial inventory is submitted. As part of this approach, the state needs to identify ways to measure improvement. Improvement can be tracked with some statewide or water system specific metrics.

Some metrics to consider:

1. Number or percent of LSLs replaced
2. Number or percent of unknowns identified
3. Number or percent of line material verified
4. Money allocated per water system or per LSL*
5. Cost per service line identification*
6. Demographic information on areas where LSLs are replaced*

**These metrics could have funding dollars associated with them.*

The state needs to identify these measures and how they want to track them when setting up the database for compliance. If the state is going to set performance standards for water systems, these metrics may be a compliance requirement. This information needs to be accessible to other state programs such as sample monitoring compliance, funding, etc.

Will the state require systems to submit documentation as a means of proving non-lead and will the state retain this information? Or will the water system maintain all the information and the state develops a review process with the water system? Whichever the case, there will be long-term record management outcomes which may pave a path to an all materials inventory for water systems. This could lead to improved asset management or other state-specific initiatives to improve water system records and system maintenance.

Assessment and potential changes to water systems monitoring points and monitoring frequency will be an outcome of every inventory update. The state needs to ensure data is available or provided to other programs (blood lead level monitoring program, school/daycare licensing agencies, etc.) quickly after data submissions to ensure correct monitoring points.

Ultimately, the state may have an outcome of a statewide map or other means of demonstrating the data involved with the rule. As noted in Section IV, the state may need to build to that point but should set a deadline to reach the goal and develop a management schedule to accomplish the goal. The metrics noted above could be associated with the map and provide meaningful information on where inventory improvements occurred.

VI. Legal Issues

There are several areas of potential legal concern that must be addressed by states and systems. Listed in this section are areas where there are likely national concerns, and states and local jurisdictions may have others.

LSLI Template

There are items requested in the template that are not strictly required by the rule as it relates to the service line inventory but will be useful in other parts of the rule implementation. The states that cannot be stricter than the federal rule may need to justify why that additional information is needed. Keep in mind that some of these components may see changes under the LCRI. Examples:

- To have a current and accurate sampling plan, information is requested about the specific site so that its classification in the site classification tier structure is known.
- Specific use of the building is requested so that the site can be put into the proper category for the sampling plan, and also to identify schools and childcare businesses to facilitate the 3Ts sampling at those entities.
- Whether the site is eligible for funding for LSLR or GRR is necessary for determining use of the infrastructure funds that will become available.

Private Property Access

Accessing private property is required in two areas: verification of the service line material and replacement of the service lines composed of lead or of galvanized iron/steel requiring replacement. It is likely that most, if not all, community systems will have some portion of the service line on private property (aka privately owned service line). Non-transient noncommunity systems will likely have more legal control over their service lines and interior building plumbing. There are many areas of legal interpretation that may be needed on these issues, since the jurisdictions in which the systems are located may have varying codes, ordinances, rules, and laws that pertain to the various aspects of the LCRR. Entry of system personnel into the building has its own legal issues which must be considered relating to the safety and legal protection of system staff. If the state program inspection staff will be looking at the interior building service line and plumbing, the same considerations are needed for them.

Public Dissemination of Inventory Information

There are concerns about disseminating the information gained during the LSLI about a specific building's service line that may affect the value of the property. Notification of a lead service line on the private side could adversely affect the real estate transaction, resulting in a lower selling price. There is currently no federal requirement in the real estate transaction rules that requires the disclosure of a lead service line or lead plumbing before purchase of the property. Some states may have such a requirement in their state rules or may consider changes to ensure the notification of the LSL/GRR/unknown service line is provided to the new property owner. In 141.85(4)(e)(2), the LCRR requires the system to notify persons if they have LSL, GRR, or unknown service line within 30 days of the completion of the inventory and then annually. Additionally, the federal requirement may be changed in the future to have what constitutes "lead safe" service lines described in the "lead safe" definition.

The posting of the distribution system inventories indicating lead, galvanized requiring replacement, and unknown composition service lines may bring privacy concerns to the forefront. Some systems

now have local ordinances that require any lead line exposed to the surface for any reason to be removed; some have a practice of removing any lead service lines discovered during routine distribution system work; and other systems have no protocols. Posting the inventories on the Internet also provides for a wider dissemination of information than was previously available and is now required in the LCRR for systems serving more than 50,000 people. Some states may require all LSLI to be included on the Internet, perhaps on the state's website. Some states may have existing laws that prohibit disclosure of the required information in a public manner.

The rule requires each service line to be identified by a street address or unique identifier. The most common method under the original lead and copper rule was to use the building street address. If a unique identifier is used, there must be a crosswalk key available that relates the street address to the unique identifier, so that the state can ensure that all the service lines have been evaluated. In many states, such a key would be public information, which in essence would mean that the street addresses are available to the public.

Rural water systems have a unique challenge in that there may be buildings with the same street address but located in different towns. A common example is 100 Main Street, which could be in three different towns in a multi-county rural water system. Using a unique identifier is allowed, although the state must still be able to ensure that all service lines have been evaluated. Including the town in the street address can resolve this issue.

In rural areas, rural route numbers used to be the prevalent way the homes were identified for mail service. In some states, rural individual properties are identified by a fire number, which is typically the same as the house number. Since the advent of county-wide 911 emergency service systems, many if not all of the rural routes have been converted to the emergency 911 address, which is the same as a house number, street address, and nearest town. States may have unique identification processes for rural areas, so these issues should be evaluated as part of the LSLI process.

Other considerations for private information should be made, as well since HIPAA and some other demographic information may be sensitive.

Mandatory LSLR

In EPA's December 17, 2021 *Federal Register* notice regarding the next steps for the LCRR, EPA noted multiple areas that may be revised under the LCRI. One of these areas is LSL replacement and the LSLR plans. As the final LSL replacement requirements are yet unknown and the rule is in flux, information below regarding both requirements is based on the LCRR as promulgated in January 2021. Both LSLR and LSLR plans, as well as their compliance date, may change.

All systems that have lead, galvanized requiring replacement, or lead status unknown service lines must develop a lead service line replacement plan. The replacement plan is then enacted under the following scenarios:

1. Any CWS serving more than 10,000 people:
 - a. If the lead 90th percentile exceeds the action level of 0.015 mg/L, the system must fully replace at least 3% of LSLs per year based upon a two-year rolling average for at least four consecutive six-month monitoring periods.
 - b. If the lead 90th percentile is within the range of 0.010-0.015 mg/L, the system must implement a LSLR program with replacement goals in consultation with the primacy agency for two consecutive one-year monitoring periods.

2. Any CWS serving fewer than 10,000 people and any NTNC with a lead 90th percentile that exceeds 0.010 mg/L and that select LSLR as the compliance option, must complete the LSLR within 15 years if the 90th percentile ever exceeds the action level of 0.015 mg/L.

Only the full LSL replacement (entire line, regardless of ownership) counts towards the mandatory rate or goal-based rate. The rule describes the scenarios of public/private ownership of the service line, but it does not address the solely private ownership of the service line.

There are systems within the country, including large municipal systems, where the system does not own any portion of the service lines within its distribution system; the entire service line is owned by the property owner from the distribution main to the building inlet. The rule specifically states the system is not required to bear the cost of replacement of any portion of the service line that is not owned by the system. *[141.84(e) 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. 141.84(g)(7) Nothing in this paragraph requires the water system to bear the cost of replacement of the customer-owned lead service line.]*

Such a system will fall into noncompliance if the 90th percentile action level of 0.015 mg/L is exceeded, and an insufficient number of property owners agree to replacing their LSLs or GRR at the required minimum replacement rate.

There are several legal issues that may need to be addressed in this area, depending upon the ownership scenarios in the state:

- System ordinance or state law that prohibits using public funds on private property, which could prohibit the system from paying for the private side replacement.
- State enforcement efforts if the system cannot comply with the removal percentages because of property owners that refuse to replace the service lines, and the system enters noncompliance. Does the state have the legal authority to require the system to replace the privately owned service lines in its distribution system?
- There will likely be privately owned service lines where the owner refuses all efforts to replace the line.
- There could be a situation where the person living in the building wants the line replaced but the rental or absentee property owner refuses to have it done.

Determine what strategies are available to assist LSL or GRR service line replacement on private property, whether template ordinances could be used, the type of outreach needed to ensure compliance, effective strategies employed by other systems, other infrastructure funding sources, etc.

Attorney General Opinion

Discussion of these issues with the state's Attorney General's Office would be very beneficial at the beginning of the process. The Attorney General interpretations may determine how the state will meet primacy requirements via data collection and should help to avoid pitfalls that could result in litigation. The state may need legal advice or opinions on its authorities before it can proceed with rule adoption, and the typical state AG Office has significant lead times. Encourage the systems to evaluate any local legal issues at the onset when describing the rule requirements during the education of operators.