

WATER INDUSTRY GUIDANCE FOR COMPLETING INVENTORY REQUIREMENTS OF THE FEDERAL LEAD AND COPPER RULE REVISIONS



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CONTENTS

Contributors	3
Introduction	3
A Note on California	3
I. Completing and Updating the Inventory	4
A. Standard Operating Procedures	4
B. Classifications of Lead, GRR, Non-Lead, or Unknown	4
C. Reviewing Records	5
D. Investigative Methods	6
E. Third-Party Partnerships	7
F. Updating the Inventory	7
G. Notifying Customers	8
II. Lead Service Line Replacements	8
III. State Water Board Provisions	9
IV. Funding	9

DISCLAIMER

The California water industry drafted this document and developed it collaboratively with the State Water Resources Control Board's (State Water Board) Division of Drinking Water. It is not an official regulatory document. If there is a conflict between this guidance document and any current or future state or federal rule, regulation, guidance document, or other legally binding order, the official state or federal requirement(s) control. Complying with this document is not a substitute for meeting all state and federal regulatory requirements. Compliance with the Lead and Copper Rule is subject to state or federal approval.

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INTRODUCTION

In January 2021, the United States Environmental Protection Agency (USEPA) issued a revised lead and copper rule intended to protect consumers from the impact of lead exposure in drinking water. Under the [Lead Copper Rule Revisions](#) (LCRR), USEPA requires water systems to conduct a comprehensive inventory of both publicly owned and privately owned service line materials. The LCRR requires water systems to identify any lead, galvanized requiring replacement (GRR), or “lead status unknown” service lines and to make the inventory information publicly available.

This document provides guidance to water systems on the methods for identifying service line materials and the type(s) of information water systems must include in their service line inventory under LCRR requirements.

A NOTE ON CALIFORNIA

The LCRR’s principal objective is for all covered water systems to identify lead service lines (LSLs) and GRRs and eventually remove them. The USEPA wrote the LCRR under the assumption that all LCRR-regulated water systems have or had at least some LSLs, either utility-owned or customer-owned. The LCRR and the USEPA Guidance Document describe strategies and techniques to find and inventory current LSLs or former LSLs and GRRs. It is important to note that utilities in California currently have no LSLs. The best evidence to date shows that many, if not most, LCRR-regulated water systems in California have no customer-owned LSLs. Although there were thousands of LSLs installed during the 1940s, these have all been removed.

For an LCRR-regulated water system with no LSLs, using the techniques described in the LCRR would be challenging and expensive. Because some water systems utilized LSLs in the past, it is necessary for those systems to find their GRRs using the techniques described in the LCRR. The USEPA recognized this situation and wrote a section in the Guidance Document to address it: Chapter 6 Section 6.3, titled “Requirements and Recommendations for Systems with Only Non-Lead Service Lines.” This section specifically addresses LCRR-regulated water systems with no LSLs, neither currently nor in the past

All LCRR-regulated water systems in California should examine the aforementioned USEPA guidance before deciding how to comply with the LCRR.

I. COMPLETING AND UPDATING THE INVENTORY

USEPA Requirement

By October 16, 2024, the LCRR requires water suppliers to complete an initial inventory of their system, which includes system-owned and customer-owned service lines.

Industry Recommendations

Under California Health and Safety Code section 116885, California water suppliers were required to complete an inventory of system-owned service lines by 2018. In practice, system-owned service lines typically were inventoried in the water system's Geographic Information System (GIS) and/or Computerized Maintenance Management System (CMMS)¹. The LCRR inventory will differ from prior practice because water suppliers with lead or GRR service lines on the utility or customer side are required to make portions of the inventory publicly available in a readily accessible format, such as an interactive map or PDF document. USEPA encourages water systems to include additional information in their inventory, such as location identifiers for all service lines, as well as street addresses. For water systems that do not have their own inventory systems, the State Water Board is making available a spreadsheet in Excel format that can be used.

Urban retail water suppliers have annual reporting requirements to the State Water Board, including information on lead inventories and replacements. This is an opportunity for water suppliers to refine inventories after the initial inventory submission if needed. Additionally, the inventory should be updated routinely as information about customer-owned lines becomes available.

A. Standard Operating Procedures

USEPA Requirement

The USEPA recommends continuously updating the inventory as information becomes available and suggests that water suppliers develop a system to update their inventories.

Industry Recommendations

Each water system should develop and use a written Standard Operating Procedure (SOP). Field staff collecting information and office staff recording the collected information should both use the SOP.

Visual inspection when utility assets (meters, service lines, valves, etc.) are replaced or repaired is one example of what to include in an SOP. Visual inspections can also occur when utilities send inspectors to visit customer sites (e.g., water quality complaints, conservation inspections, and other services). During those visitations, the customer service line can be classified and the results recorded; a photo may supplement the written recording. It is important that an SOP also includes information about not disturbing the pipe until confirming the pipe is not lead or a GRR service line. If the pipe is lead or GRR, the SOP should indicate the water system needs to deliver a pitcher filter, provide house pipe flushing instructions, and provide health information to the customer.

Additionally, as a best practice, water systems should document their records review at regular intervals. This is discussed further in Section C.

B. Classifications of Lead, GRR, Non-Lead, or Unknown

USEPA Requirement

Under the LCRR, the LCRR inventory must include the classification of service lines as either lead, galvanized requiring replacement (GRR), non-lead, or lead status unknown.

Industry Recommendations

The LCRR assumes every state has at least some lead service lines (LSLs). However, on the utility side of the meter in California, there are more than 11 million service lines, and only four known to be lead are in use. There are a few thousand service lines that are of unknown material. Non-lead lines

¹ Note that water systems in California may have used other databases or applications such as spreadsheets, customer care, or billing databases to contain service line information.

may include cast iron and wrought iron service lines. Galvanized iron or steel service lines are also non-lead if they have never been connected to an LSL or to a service line of unknown material. The difficulty of completing inventorying requirements in California will be to prove the absence of LSLs. Given this dynamic, it is important for California water systems to be able to utilize appropriate survey and statistical methodologies to complete an inventory of their unique service area.

When there are conflicting records about the composition of service lines, water systems should consider classifying the line as unknown to allow the system to investigate the service line in detail. However, under the LCRR, service lines classified as unknown will be treated as LSLs until their material is identified; they will be subject to the same customer notification, disturbance, and replacement requirements as LSLs.

Water systems may choose to subclassify service lines in the inventory in order to provide more detailed information about service line materials in their service area. Water systems also may need to create sample siting plans while working on the inventory, which requires additional information such as dating the system and physical inspections.

C. Reviewing Records

USEPA Requirement

Classification of non-lead service lines must be supported by evidence-based records, methods, or techniques to prove it is not lead or GRR. USEPA recommends documenting the records reviewed as a best practice.

Industry Recommendations

Water systems should review internal records that are readily accessible; these records often are kept within GIS or CMMS systems. Local laws such as plumbing codes, construction standards, sanitation ordinances, and other laws, however, named, are also helpful and are legally enforceable requirements. Land-use documents from local

planning departments, public works departments, and tax assessor offices can be useful in identifying tract housing. Tract housing is designed and constructed by a single party, and the houses constructed in a tract would reasonably be expected to have the same plumbing materials. It is also a very conservative assumption that a customer-owned service line was installed when the house was constructed and is of the same diameter as the water system's service line.

Before 1942, most cities and counties in California had Plumbing Codes (or similarly named plumbing standards) precluding the use of lead as a plumbing material. These Plumbing Codes did not ban the use of lead as a plumbing material, but they had a schedule of approved materials and lead was not listed as an approved material for pipes (it was approved for caulking, bends, and traps). During the late 1930s and early 1940s, many California plumbing authorities began adopting the Uniform Plumbing Code (UPC), which allowed the use of lead for water supply pipes. However, only pipes with an internal diameter of 2 inches or less were allowed for lead pipes. In the 1950s, the UPC was revised several times with minor substantive changes regarding the allowance of lead use. Table A in the UPC listed "lead pipe and traps" in 1952 and was later revised to be "lead pipe bends² and traps" in 1955. It wasn't until 1985 that lead was no longer listed as an approved material in the Chapter for Water Distribution. Then, in 1988, lead was no longer listed as an approved material for water pipes and fittings.

At a minimum, water systems may be able to categorically exclude areas in their service territory as not having lead lines if the construction was done after 1986. However, water systems may be able to use an earlier date if that system can identify a city or county law that precludes the use of lead. Any city or county law used in this manner must explicitly exclude the use of lead for potable water lines. Because Plumbing Codes apply to pipes on both sides of the meter, it is reasonable the population of service lines on the customers' side of the meter is generally reflective of the original population of service lines on the utility side of the meter.

2 Bends are short sections of pipes (such as pigtails and goosenecks) that connect two other larger pipes.

Routine evaluations, repairs, or replacements of meters are opportunities to assess the accuracy of historical records.

Customer-owned service lines might be very challenging to investigate because the customer may not have an accurate record or is unwilling to provide the information.

If water systems find historical records unreliable or have conflicting records, they should consider reclassifying affected lines as unknown. This gives the system an opportunity to investigate the service lines in detail.

D. Investigative Methods

USEPA Requirement

USEPA has identified acceptable investigative methods, including visual observation, water quality sampling, and excavation.

Industry Recommendations

Investigative approaches may be tiered, with the first step being the most feasible and least expensive. Later, more complicated or more expensive investigative methods may be employed if needed.

Visual inspection is the simplest investigative method. In principle, assessing service line material is not difficult: iron pipes, copper pipes, plastic pipes, and lead pipes can be distinguished based on visual inspection. The main difficulties are: 1) sufficiently cleaning the service line to assess it, 2) illuminating the service line enough to assess it, and 3) having enough of the service line visible to assess it. In some cases, the meter is flush against the wall of the meter box and the pipe cannot easily be assessed.

Generally, customer service lines are accessible for evaluation at the meter box. Customers can help in the visual identification process at the meter box because it is easier, in most cases, to access than the building entrance. Additionally, specific tests can be applied, such as a chemical test or x-ray fluorescence, which water systems or customers

can use themselves when provided sufficient information and direction on using these tests.

Water systems can prioritize investigation at locations with unknown, potential lead, or GRR service lines by considering sensitive subpopulation locations, such as schools, childcare facilities (when applicable), environmental justice communities, and communities that are most at-risk of elevated drinking water lead levels.

Water quality sampling is a difficult and more expensive approach. It requires flushing the water line to sample the fifth or sixth liter of water instead of the first. It also requires an accredited laboratory to perform the test. Water quality sampling, closed circuit television (CCTV), and mechanical or vacuum excavation are examples of later stage, secondary testing where there could be evidence of the presence of LSLs.

Predictive Modeling

The USEPA allows states to develop and adopt specific criteria for investigative/ predictive modeling, or a state can approve project plans that water systems submit. Water systems must have an approved plan before conducting any modeling efforts to complete their inventory requirements. In California, water systems can submit proposed plans to their district or staff engineer for review and must obtain written approval via a letter from the State Water Board's Division of Drinking Water.

For large systems, it is generally not practicable to physically assess each individual water service line. Recognizing this limitation, the USEPA allows water systems to use predictive models to build their service line inventory. California is well-suited to use a predictive modeling approach: it is well-documented that service line materials in California are almost entirely non-lead. When using predictive modeling, water systems should conduct targeted sampling to verify the non-lead status of service lines across geographic regions of their service areas and among buildings of different ages. Any predictive modeling plan submitted for approval should include a randomized, representative set to fully understand the entire system's likely materials.

Water systems can combine the results of an inspection set with the characteristics of those addresses to calculate the probability of finding an LSL or identifying other service line materials.³ If any lead service lines are encountered during sampling, the water system should focus on assessing other service lines of similar age and location to better understand the extent of any lead service lines that might be present.

A sample predictive model may use a historical approach to evaluate areas that are more likely to have lead. For example, a system may determine that areas with construction done after the UPC ban on lead (or earlier county/city code ban on lead) do not contain lead. By dating the system, a water system may statistically eliminate areas with no lead (e.g., anything from 1986 to the present, and any pipes 4" in diameter or larger are considered non-lead). The following example is a template that can be used to develop a water system's predictive modeling plan. The State Water Board needs to approve the plan.

Example Physical Verification Model 1:

If a water system has 50,000 connections that are unknown, it can plan to do 500 randomized physical verifications. That water system can look at 100 more in the oldest areas of its service territory. In this scenario, if lead is not found, the water system would inventory those 600 connections as the material found present and physically verified, and the other 49,400 connections would be determined as non-lead statistically verified.

Example Physical Verification Model 2:

Another example would be to perform physical verification to the 95th percentile of areas in the service territory constructed between the 1950s and 1986.

The State Water Board will also allow an interpolation plan for smaller systems or for smaller areas within a large system. A water system can look at a portion of a community where buildings or homes were built at the same time, by the same contractor and same

location and assume all homes or buildings were built with the same material. By physically inspecting a portion of the homogenous community and finding the same material, the water system can assume or interpolate that the rest are the same as what has been physically inspected. Two or more factors that distinguish one area from another should be used: community age/construction year, location, contractor/ list of materials, and others as approved by the State Water Board.

Water systems with more than 10,000 connections need to meet with the State Water Board to discuss and refine an initial project plan incorporating mapping or system dating to aid the completion of the inventory requirement.

E. Third-Party Partnerships

USEPA Requirement

Water systems are encouraged to reach out to plumbers, homeowners associations, building inspectors, and other third parties to obtain information on service line materials.

Industry Recommendations

Water systems can also work with third parties to facilitate outreach and engagement with communities to promote self-identification and reporting of service line materials.

F. Updating the Inventory

USEPA Requirement

The LCRR requires utilities to update their inventories on a regular basis as new inventory information becomes available.

Industry Recommendations

After initial compliance, water systems should maintain compliance with inventorying requirements. Water systems can maintain compliance by actively monitoring service lines after they are classified as non-lead. There is a possibility

3 An Association of State Drinking Water Administrators [white paper](#) provides additional information on using data science to complete LSL inventories.

that LSL or GRR might be found later or that an unknown line or LSL still exists and might be present for an unknown amount of time.

G. Notifying Customers

USEPA Requirement

Water systems with LSL, GRR, or lead status unknown service lines must notify customers of their findings within 30 days after completing the initial inventory. The notification must be delivered by mail or any state-approved method; for new customers, the notification must be provided at the time-of-service initiation. Water systems must also include instructions in their Consumer Confidence Reports on how to access the inventory. USEPA is encouraging water systems to use simple and plain language to notify customers.

Water systems must submit the notification as well as service line material information to their state annually by July 1 for the previous calendar year. As part of the notification process, water systems must include information identifying the type of material, health exposure effect, any available financing method, and replacement plans for LSL and/or GRR. For lead status unknown cases, water systems must clarify their approach in verifying the material of the service line.

Water systems serving more than 50,000 people must post their inventories online. In the event a water system has no lead service lines, a statement that there are no lead service lines and a description of sources used to determine the absence of lead service lines must be published.

II. LEAD SERVICE LINE REPLACEMENTS

USEPA Requirement

Water systems are encouraged not to wait until their inventories are complete to begin conducting lead service line replacements (LSLRs). Replacing LSLs while developing the inventory may create synergies or introduce opportunities for cost savings. In California, water systems have approved replacement plans and permit amendments that contain timelines with which to comply.

Industry Recommendations

Beginning LSLRs at the same time as an inventory may be a time-consuming and resource-intensive undertaking for smaller agencies or agencies with few staff. Agencies should discuss how to

approach LSLR as part of the planning process for inventorying. It is up to agencies to create a manageable and appropriate plan, given their water system's resources.

Water systems should carefully consider equity issues in the LSLR and address barriers to participation for reasons of income, race, or ethnicity. The LSLR Collaborative (which includes the American Water Works Association as a member) has compiled best practices and resources for centering equity in the development of a LSLR plan.⁴

4 LSLR Collaborative Equity in Lead Service Line Replacement, available at <https://www.lslr-collaborative.org/equity.html>.

III. STATE WATER BOARD PROVISIONS

State Requirement

The LCRR allows states to adopt laws or regulations for service lines that are more stringent than federal inventory requirements.

Industry Recommendations

Through Assembly Bill 746 (2017) and Assembly Bill 2370 (2018), California created separate requirements for the testing of licensed childcare facilities and K-12 Schools, which differ from the Federal Rule. The LCRR includes a requirement for the ongoing sampling of childcare facilities and K-12

schools. The scope of the sampling may change in the LCRI. Water systems should comply with state requirements until a federal rule is adopted. Once a new federal rule is in place, water systems can refer to appropriate federal guidance regarding sampling requirements.

A list of schools/childcare facilities served by the system must be maintained by the system. This could be a list that evolves often. It will require substantial upkeep for the agency.

IV. FUNDING

Funding sources are available from the State Water Board for completing the inventorying process and LSLR. Areas likely to have LSLs will benefit from inventorying, but it all could bring a return on investment for newer areas that are unlikely to have LSLs. The State Water Board should allow alternative inventorying methods (i.e., interpolation) for areas that are unlikely to have LSLs. Currently, these methods are subject to State Water Board approval. Water systems should submit requests in advance of the inventory deadline and additionally request the State Water Board expediently review the requests to not delay water agencies that are completing their inventories.

