



Region 8
Safe Drinking Water Act
Direct Implementation Policy #2025-01
Lead and Copper Rule

Service Line Inventory and Replacement Policy

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Applies to: State of Wyoming, Federally Recognized Tribes in Region 8

Policy: Direct Implementation Policy

Attachments

¹ Unless otherwise noted, the cited regulations are to the Lead and Copper Rule Improvements of the National Primary Drinking Water Regulations (NPDWRs).

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1. Introduction

The Lead and Copper Rule (LCR) is the National Primary Drinking Water Regulation (NPDWR) first promulgated in 1991 that requires actions by public water systems to reduce levels of lead and copper in drinking water. On January 15, 2021, U.S. Environmental Protection Agency (EPA) issued the final Lead and Copper Rule Revisions (LCRR).² On October 8, 2024, the EPA issued the final Lead and Copper Rule Improvements (LCRI)³ to significantly reduce exposure to lead through drinking water. The Final LCRI builds on the 2021 LCRR and the original LCR and superseded all previous lead and copper rules.⁴ Water systems must comply with the LCRI by November 1, 2027.⁵

During the interim period from October 16, 2024, to November 1, 2027, LCRI requires water systems to continue to comply with the LCR as codified on July 1, 2020, alongside the retained elements of the LCRR as codified on July 1, 2024.⁶ Specifically, the LCRR service line inventory requirements that EPA did not change in the LCRI and that systems must comply with during this interim time are:

- Development and submittal of an initial service line inventory (including making it publicly accessible) by October 16, 2024.⁷
- Notification of service line materials and associated certification to State.⁸

The final LCRI incorporates the 2021 LCRR service line inventory requirements above and adds that water systems must comply with the following new inventory requirement by November 1, 2027 (See Appendix E for full list of requirements and deadlines⁹):

- Develop an updated initial service line inventory, called the “baseline” inventory, that includes information identified on connectors as well as any updated or new information on service line materials and locations.¹⁰

Starting November 1, 2027, water systems must ensure that both the baseline inventory and any inventory updates of service line and connector materials comply with LCRI provisions.¹¹ The service line inventory aims to identify the materials of all service lines, ultimately facilitating the full replacement of all lead and galvanized requiring replacement (GRR) service lines.

The LCRI requires water systems to review and use certain sources of information to identify service line materials in the inventory.¹² The LCRI also permits water systems flexibility to use “other” sources of information for identifying service line materials, prompting the EPA Region 8 to establish appropriate inventory requirement policy provisions for systems it regulates in Wyoming and Indian Country.¹³ The “other” sources the EPA Region 8 may approve include any evidence-based resource, information, or identification method for the development of the baseline inventory or inventory updates.¹⁴

² 40 CFR § 141.84(a)(1) (LCRR).

³ 40 CFR § 141.80 *et seq.*

⁴ *Id.*

⁵ 40 CFR § 141.80(a).

⁶ 40 CFR § 141.80(a)(3)-(4).

⁷ 40 CFR § 141.84(a)(1)

⁸ 40 CFR §§ 141.85(e), 141.90(e)(13), 141.90(f)(4) (July 1, 2024) (LCRR).

⁹ See [Appendix E](#)

¹⁰ 40 CFR § 141.84(a)(2); *see also* 40 CFR § 141.80(a)(3).

¹¹ 40 CFR § 141.84(a).

¹² 40 CFR § 141.84(b)(2).

¹³ *Id.* (“The water system may update the inventory using other sources of information not listed in paragraphs (b)(2)(i) through (iii) of this section if the use of those sources is approved or required by the State.”).

¹⁴ 40 CFR § 142.16(d)(5).

This document provides guidance for the water systems in Wyoming and Indian Country that EPA Region 8 directly regulates and establishes EPA Region 8 approved “other” sources of information as policy. This guidance ensures that implementation of the LCRI remains effective and compliant with evolving regulations, technological advancements, and best practices in lead service line identification and mitigation. This document does not create any new authority for the EPA Region 8 beyond existing legal frameworks, and, except where quoting the LCRI, it does not establish binding norms. This allows the EPA Region 8 discretion to deviate from the policy guidance as needed.

2. Service Line and Connector Inventory Development

All water systems must develop:

- An Initial inventory of service line materials and submit it to the State¹⁵ by October 16, 2024.¹⁶
- A Baseline inventory of service line and connector materials and submit it to the State by November 1, 2027.¹⁷

Baseline Inventory Required Elements:

- ***All service lines and identified connectors*** that are connected to the distribution system regardless of ownership status.¹⁸
- ***Street address for all service lines and their identified connectors.*** Where a street address is not available, a unique locational identifier may be used (e.g., block, Global Positioning System or GPS coordinates, intersection, or landmark).¹⁹
- ***Connector Materials Classifications:***
 - “Lead.”
 - “Non-Lead” or alternatively, the specific non-lead material (e.g., plastic or copper).
 - “Unknown.”
 - “No connector present.”²⁰
- ***Service Line Material Classification:***
 - “Lead.”
 - “Galvanized Requiring Replacement” or “GRR.”
 - “Non-Lead” or alternatively, the specific non-lead material (e.g., plastic or copper).
 - “Lead Status Unknown” or “Unknown.”²¹

3. Information Sources

The list of information sources that water systems must and can use to prepare inventories is broad and includes multiple types of records and information sources.²² This section identifies: (1) the information sources that water systems must use for the inventory as required by the federal regulation, and (2) the EPA Region 8’s

¹⁵ See definition of “State” in [Appendix D: Glossary of Terms](#).

¹⁶ 40 CFR § 141.84(a)(1).

¹⁷ 40 CFR § 141.84(a)(2).

¹⁸ *Id.*

¹⁹ 40 CFR § 141.84(a)(4).

²⁰ 40 CFR § 141.84(a)(2)(ii).

²¹ 40 CFR § 141.84(a)(3).

²² See 40 CFR § 141.84(b).

permitted “other” information sources approved for use to assess service line and connector materials in the inventory.²³

3.1 LCRI Required: Gather Information and Review Existing Records

Water systems must gather and review the following applicable sources of information to identify service line and connector materials for the baseline inventory and inventory updates:

- All construction and plumbing codes, permits, and records or other documentation that indicate the service line and connector materials used to connect structures to the distribution system;
- All water system records on service lines and connectors, including distribution system maps and drawings, recent or historical records on each service connection and connector, meter installation records, historical capital improvement or master plans, and standard operating procedures;
- All records of inspections in the distribution system that indicate the material composition of the service connections and connectors that connect a structure to the distribution system (including where materials were identified during normal operations); and
- All records from conducting lead or GRR service line replacements, service line material inspections, and lead connector replacements.²⁴

3.2 The EPA Region 8 Approved “Other Sources of Information”

Water systems may also use the following additional information sources to identify service line materials in the inventory:

- Records indicating only that the service line is greater than two (2) inches in diameter, (but does not indicate the specific material(s)), can be used as evidence for non-lead material classification in the inventory;
- Documentation of affidavit(s) from current water system personnel, licensed plumbers, experienced water operators including retired personnel, and plumbing code inspectors; and
 - Affidavits should meet the following guidelines:
 - Be in writing, identify the location (e.g., site specific or system wide) and portion or portions of the service line the affidavit is for, and if possible, specify the material (i.e., copper, plastic, galvanized, etc.).
- Customer Self ID (e.g., personal records on service line materials, documentation of service line visual inspection, etc.).

(Note that service lines identified as non-lead in the inventory using these information sources are required to be included in the Non-Lead Validation Pool).

4. The EPA Region 8 Approved Step-by-Step Process for Developing an Inventory

The following process provides water systems an approved framework and methodologies to develop the service line inventory that fulfills the LCRI’s intent.

The following methods are approved as a part of this inventory development step-by-step process:

- Simple System Wide Statistical Method (SWSM).

²³ *Id.*

²⁴ 40 CFR § 141.84(b)(2).

- Simple Statistical Predictive Model (SPM).

The process can support the development of the service line inventory by:

- Reducing the number of investigations needed to assess materials of unknowns; validate non-lead, and determining a galvanized service line is non-lead (i.e., not GRR).
- Estimating the material prevalence of LSLs and GRR lines.

4.1 Step 1: Identify Service Line Materials from Historical Records Review

For the baseline inventory, water systems must include any new information on service line materials identified using:

- The required sources listed above in Section 3.1.
- The optional EPA Region 8 Approved “Other” sources listed above in Section 3.2.

Water systems should classify each service line or portion of service line where ownership is split using the material classification categories listed above in Section 2.1.

- Classifications must be based on the material definitions given in Appendix D.
- Systems should track the information source used to identify each service line.

4.2 Step 2: The Simple System Wide Statistical Method (SWSM) Process

The SWSM process is a common-sense, low-burden, and statistically sound way to develop inventories without having to perform costly and disruptive excavations at every home/building. Instead of verifying the material of every service line classified as unknown and/or non-lead requiring verification (NLRV) (including galvanized is not GRR) in the inventory, the water system may assess a random subset to:

- Verify the reliability and completeness of service line records, as reliability can vary;
- Develop a statistical understanding of service line materials throughout the distribution system to guide verification or replacement efforts; and
- Demonstrate there were never LSLs system wide (including galvanized is not GRR).

Information gathered through the SWSM process provides:

- A verified estimate of the proportion of each service line material type and material configuration across the distribution system (system wide), supporting a highly confident basis for replacement planning and service line material notification efforts;
- A basis to evaluate the reliability of existing service line material records and ability to make assumptions about service lines materials throughout the distribution system; and
- Baseline data to predict materials at other locations while used in combination with other information sources.

The SWSM process does NOT provide:

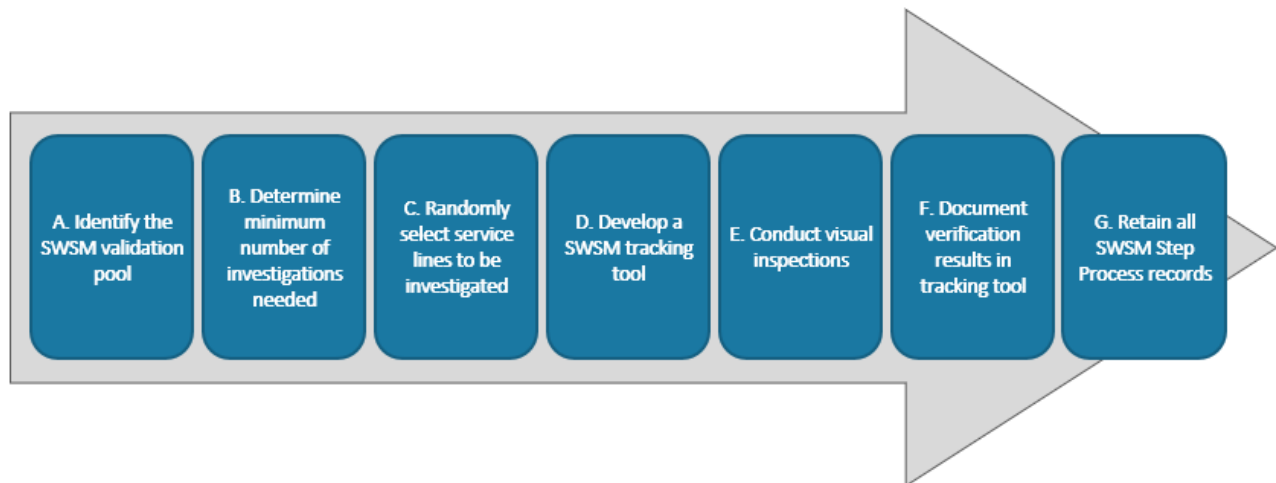
- The material configuration of service lines for every building served; and
- The extent to which specific distribution areas differ from the system-wide average occurrence of each service line material.

SWSM Exceptions:

- The SWSM Process is unnecessary for water systems that have all “known” service line materials in their inventory (lead, GRR, or non-lead, as defined below).

The SWSM Process Steps:

Figure 1: Step-by-Step Process for Developing an Inventory



A. Identify the SWSM validation pool

The Verification Pool consists of all unknown and non-lead service lines in the inventory **except** for those that are considered “known.”

1. **Exclude: “Known” Service Lines from The Verification Pool:**

Non-Lead: “known” if identified by the following:

- Records indicate the service line was installed after the federal lead ban became enforceable, or the date of a State or local lead ban, whichever is earlier.
 - The federal lead ban became enforceable on June 19, 1988. Check with the State or local government to verify the compliance date for any State or local lead bans.
- Visual inspection of the pipe exterior at a minimum of two points.
- Previously replaced lead or GRR service lines.²⁵

Lead/GRR: “known” if identified by the following:

- Confirmed through visual inspection of the pipe exterior at a minimum of two points.
- Any record, method, or technique considered by the system as sufficient to confirm as lead/GRR without further investigations.

Note that all “known” lead/GRR service lines that are not included in the validation, must be included the replacement plan. If they are not known yet, include in the validation pool.

2. **Include: Unknown Service Lines:**

Service lines are considered unknown if evidence-based records from the list of required or approved information sources cannot demonstrate that the pipe material is a lead, GRR, or a non-lead service line in accordance with the service line material classification criteria.²⁶

3. **Include: All Non-Lead Service Lines Requiring Validation (NLRV)**

Non-lead lines requiring validation are all service lines in the inventory that do not meet the definition of “known,” as identified in Step 1.

B. Determine the minimum number of investigations needed

²⁵ 40 CFR § 141.84(b)(5)(i); see also 40 CFR § 141.84(b)(2)(iv).

²⁶ See 40 CFR § 141.84(a)(3)(iv).

- Water systems should combine all unknowns and all NLRV identified above into a “SWSM Validation Pool” and count the total number of all service lines in the SWSM pool.
- Water systems should use the chart in Appendix A to determine the minimum number of service lines that must be investigated to achieve a 95% confidence level with a 5% margin of error.

C. Randomly select service lines to be investigated

- Water systems then randomly select service lines from the SWSM pool for visual inspection. The number of service lines selected must be at least the number identified in Step B. Water systems must use an unbiased method to randomly select service lines, ensuring each service line has an equal chance of selection and generate a representative group. The method described in Appendix B, is the approved method for generating a random sample for this process.
- *The water system is not required to conduct validation at a site if physical access to private property is necessary to complete the validation and the water system is unable to gain access. The water system must replace the site by selecting a new service line from the SWSM Validation Pool by repeating this step.*

D. Develop a SWSM tracking tool

Water systems should develop a tracking tool, such as a spreadsheet, for the randomly selected locations identified above (Step C), with fields for the service line material based on records, information source(s) used to identify service line material, and service line material(s) based on physical verification. See Appendix C for an example.

E. Conduct service line material investigation using a two-point visual inspection

Water systems will investigate the actual materials of each service line identified in Step C by conducting visual inspection at a minimum of two points along the service line exterior. If service line ownership is split, then one point must be inspected per side. If the water system has already visually inspected the selected site at one point, they must inspect one additional point, following the same requirements if ownership is split. See Section 5.1 for the required method for conducting visual inspection.

F. Document verification results in the tracking tool

In the SWSM tracking tool, water systems will record the specific material observed at each service line point during the investigation, such as lead, copper, plastic, or galvanized steel. Water systems should avoid labeling as just “non-lead.”

G. Retain all SWSM Step Process records

Water systems using the SWSM process must retain all documentation regarding how decisions were made during the development of the service line inventory and make it available to the EPA Region 8 upon request:

- Investigation methods used to conduct visual inspection (i.e., excavation, in home, access through meter pit, etc.).
- Locations where visual inspections were conducted (i.e., at main, main-meter, meter-house, at building foundation), and whether it was on the water system owned side or customer owned side.
- Data comparison decisions for making assumptions.
 - Decisions vary system to system, so maintain records to support your decision making in case of inquiry by the EPA Region 8.

4.3 Step 3: Evaluate Results of Physical Verification

After completing the SWSM process steps, systems must review the information collected to:

- **Assess Record Reliability:** for sites selected for visual inspection, water systems should compare information from historical records to the physical verification findings to evaluate record accuracy. If water systems find discrepancies, they may need to conduct further verification (see Step 5).
- **Predict Materials at Other Locations:** water systems should combine verification results with reliable records to predict materials in multiple, smaller areas of the distribution system.

4.3.1 Assess Record Reliability

Water systems should compare physically verified material data to existing records.

Compile all relevant information from existing records:

- All relevant information related to the service line materials: tap cards, as-builts, permits, institutional knowledge, etc.
- Additional Information useful for comparison: infrastructure and structure age (main, service line, building), timeline of projects, contracted work agreements, meter and main repairs or replacements, SOPs, or ordinances.

Relevant information varies by system, so identify and compare all useful data methodically.

Compare the existing records findings to the data collected during the SWSM process: water systems should compare the records and data to build confident assumptions using various methods, including:

- Whether physical verifications confirm existing records as accurate;
- Considering errors in the data;
- Patterns in reliable versus unreliable data; and
- Accuracy of institutional knowledge, if any.

By understanding how reliable historic records are for correctly identifying the service line materials, the water system can build confidence in what assumptions can and cannot be made by understanding data comparisons.

4.3.2 Assess Ability to Make Assumptions Based on the Reliability of the Records

After reviewing the accuracy of records, water systems must determine which records are reliable enough to make additional assumptions about the service line materials throughout the rest of the distribution system.

Water systems may fall into one of these categories:

- **SWSM Confirms Records Are Reliable:**
If a water system has historical records documenting the materials of all service lines in the distribution system (both public and private property) and those records match the materials physically verified during the SWSM process, the system can have high confidence that existing records are reliable and can be used to complete their inventory.
- **SWSM Establishes Record Reliability is Mixed:**
Water systems may find some records are reliable and other records are not. While the reliable records may be used to develop the service line inventory, other records may require additional research or verification.
- **SWSM Confirms Records Are Unreliable:**
If a water system has limited records and/or records that do not match the materials found during the SWSM, it is unlikely the system can make widespread assumptions about service line materials based

solely on existing records. Instead, these systems should find additional ways to efficiently determine service line materials. This may include conducting additional physical verifications, finding new/additional data sets that can help identify where assumptions could be confidently made, or a combination of the two (see Step 5).

4.4 Step 4: Determine Where Material Classifications Can be Made

Using the Records Reliability Assessment categories defined above, water systems should decide whether they can make assumptions about the materials throughout the distributions system using the following guidance:

- **No Lead/GRR: If lead and GRR were NEVER identified in records or during the SWSM process:** (note for water systems that have galvanized lines, the system must consider if the records reliability assessment results of the SWSM Process can demonstrate with high confidence that lead was never previously upstream of the existing galvanized service lines to make any of these assumptions).
 - **The SWSM Process Confirms Records are Reliable:** The water system may classify the remaining service lines in the SWSM validation pool as non-lead.
 - **The SWSM Process Establishes Record Reliability is Mixed:** If some records were found to be reliable, the water system may only assume with high confidence that those service lines with reliable records are also non-lead. For the remaining service lines with unreliable or no records, see below.
 - **The SWSM Process Confirms Records are Unreliable:** Even if the water system had unreliable records or no records, if there is no history of lead/GRR in records and Lead and GRR was not discovered during the SWSM process, the system may assume with a high level of confidence that the remaining service lines in the SWSM validation pool are also non-lead.
- **Lead/GRR: If lead or GRR were identified in records and/or SWSM process:**
 - **The SWSM Process Confirms all Records are Reliable:** The water system may assume with a high level of confidence that existing records are reliable enough for accurately assessing service line materials throughout the distribution system. Water systems must be sure to categorize each service line or portion of service line where ownership is split with the appropriate material classification (non-lead, lead, GRR) that meets the required material classification criteria.
 - **The SWSM Process Establishes Record Reliability is Mixed:** If some records were found to be reliable, the water system may only assume with high confidence that those service lines with reliable records are dependable enough for accurately assessing service line materials throughout the distribution system. Water systems must be sure to categorize these service lines or portions of these service lines where ownership is split with the appropriate material classification (non-lead, lead, GRR) that meets the required material classification criteria. For the remaining service lines with unreliable or no records, see below.
 - **The SWSM Process Confirms Records are Unreliable:** If records do not match the materials found during the SWSM process, or if the water system lacks records, the system cannot make any widespread assumptions about service line materials based solely on existing records, especially because lead/GRR has been identified in the system. Systems must move on to section 4.5 (step 5) of this process to re-evaluate existing records, data collected from the SWSM process, and new/additional data sets to identify where assumptions may be confidently made.

4.5 Step 5: Filling in the Data Gaps

In situations where the water system has minimal to no records, and assumptions cannot be directly made, additional physical verifications may be needed and opportunities to develop strategies to improve information sources as follows:

4.5.1 Simple Statistical Predictive Model (SPM)

Water systems may need to complete additional physical verifications when records are inconsistent and unreliable. In addition to applying the SWSM process to the entire distribution system, the EPA Region 8 encourages water systems to consider applying simple statistical predictive modeling separately to multiple, smaller areas of the distribution system to demonstrate where lead/GRR is or is not present.

How does it work?

- Water systems should use a combination of information from records and the results from the SWSM process.
- Water systems should identify the various areas of the distribution system that share a common characteristic or characteristics, such as areas that were built at the same time by the same builder.
- Water systems should identify a randomized, representative set of sites in each common characteristic area and apply the statistical method used for the SWSM process to each of the areas to determine the presence of lead or GRR service lines.

Who should use this process?

- Water systems that have identified or have a history of lead or GRR service line records or that have identified lead or GRR service lines during the SWSM process may use the SPM.
- Water systems that believe they have lead or GRR service lines, but only in certain areas of the distribution system and would like to apply modeling to demonstrate there is no lead or GRR service lines in certain areas of the distribution system.
- Water systems that have galvanized service lines but lack records for some or all that would demonstrate lead is and never was never upstream (applies to system wide or just in certain areas or that share other common characteristics).

If lead or GRR service lines are found in records or through the SWSM process and the system has confirmed records to be unreliable: The water system must take the following steps if it would like to continue to narrow down the number of unknowns in the inventory using simple statistical predictive modeling:

SPM Process:

1. **Apply the SWSM Process, but only to the targeted smaller areas** of the distribution system with similar characteristics/attributes.
 - a. Create SPM pool/s: Identify the various areas of the distribution system that share a common characteristic or characteristics, such as areas that were built at the same time by the same builder. Then apply all steps (**A - G**) from the “**SWSM Process**” in Section 4.2 to each targeted area.
 - b. Use Appendix A to determine the minimum number of investigations needed and randomly select sites using method in Appendix B to create a representative sample for each SPM pool.
 - c. Use new and separate tracking tools for each SPM pool to track and record results (Example in Appendix C).
 - d. Document and retain records on how decisions were made to choose areas for the SPM.

2. **Evaluate Results:** Refer to Step 3 in Section 4.3 - Assess the materials of the service lines that were physically verified and compare them to the assumptions made based on common characteristics. Determine whether the information in records used for decision-making was confirmed as reliable.
3. **Determine Where Material Classifications Can be Made:** Using the records reliability assessment from the last step, the water system must decide whether it can make any assumptions about the materials within the targeted area using the following guidance:

Specific to the targeted area chosen:

- **The SPM Process confirms using certain attribute information in existing records is reliable** for predicting service line materials in the targeted area. The water system may assume with high confidence that those service lines with records with the specific attribute information are dependable enough for accurately assessing service line materials in that targeted area of the distribution system. Water systems must be sure to categorize these service lines or portions of these service lines where ownership is split with the appropriate material classification (non-lead, lead, GRR) that meets the required material classification criteria.
 - **The SPM Process establishes mixed reliability for using certain attribute information in existing records for predicting service line materials:** If some records were found to be reliable for predicting service line material, the system cannot make any widespread assumptions about service line materials in the targeted area based solely on the attribute information specifically chosen to predict materials.
 - Water systems need to evaluate their findings further, looking for commonalities in the records that incorrectly predicted the material, and those that correctly predicted the material, and whether there are distinct differences (i.e., whether the dates of all reliable records were after a certain date, and the unreliable records all had dates before a certain time period).
 - Then the system can use that information to strengthen its ability to make new predictions and apply the SMP again to targeted areas of the distributing system. The water system should select service lines with records that match multiple attributes, make predictions, and evaluate the outcomes from the physical verification.
 - **The SPM process confirms certain attribute information in existing records is unreliable** for predicting service line materials: If records did not accurately predict materials found during the SPM process, the system cannot make any widespread assumptions about service line materials in the targeted area based solely on the attributes chosen to predict service line materials. The system needs to re-evaluate its records, compare data in other records, and identify where errors may have occurred.
4. **Repeat the SMP Process as necessary** as new information is collected that can improve predictions over time.

4.5.2 Improve on Lack of Information in Records

Systems are encouraged to develop strategies to quickly collect missing information on service line materials and make new records. A few examples:

- Water systems could request residents to submit photos of the service line entering their building, creating new records on service line material where systems were missing information. See Customer Self ID in Section 5.1, of approved investigation methods.

- Water systems must collect information on service line material during normal operations like watermain installation, new home construction, reconnecting services, meter replacement, cross connection inspections, etc. Systems may find that creating SOPs that staff and contractors can follow to ensure that the system consistently captures missing information.

4.6 Identifying Unknowns after SWSM and SPM

The LSL inventory is considered a “living” document that water systems must continue to improve and update as more information is obtained and understood about their system and as service lines are replaced. The EPA Region 8 recognizes there is a chance of human error during this project, however, the error percentage will continue to decrease over time.

If a water system completes the SWSM and SMP process(es) and still has unknowns, the methodologies for identifying the remaining unknowns would be specific to each system. If the water system would like to use a record, method, or technique not listed in this policy, [EPA Region 8 approval is required](#). Your water system may need help with the next steps, as techniques beyond the basic simple statistical methods tend to be more complex. There are many technical assistance (TA) options available to assist you with your service line inventory and replacement needs. Visit The [EPA Region 8 LSLI Webpage](#) for additional information on TA opportunities.

5. Approved Service Line Material Investigation Methods

5.1 Service Line Visual Inspection

The service line material investigation method involves visual inspection of the exterior of the service line. The visual inspection must be performed in person by water system personnel and/or third-party entities (e.g., licensed plumbers) or by building owners/occupants self-identifying the material of the service line and submitting documentation to the water system (See customer Self ID Guidelines in this section).

- A two-point visual inspection is required to verify the material of the entire service line. If ownership of the service line is split, one visual inspection point on each side is required.
- The inspector must ensure that the service line is being observed and not a connector, main, premise plumbing, or component of the meter apparatus.

Customer Self ID:

Building/homeowners may provide a system with a record of visual inspection. These records can be used by the water system to identify the service line as “known” if the following information is provided to the water system by the customer:

- Physical address of service line and location(s) along service line’s exterior where specific materials were visually inspected;
- Self-material assessment: The self-material assessment shall include the specific material identified (lead, galvanized, plastic, copper, etc.) at each inspection point and the service line surface test results; and
- Photographic evidence of the service line that confirms the information provided in the two bullets above with high confidence.

If you would like guidance on best practices for using this method, you may seek help from an experienced TA provider. There are many TA options available to you. See [EPA Region 8 LSLI Webpage](#), for more information on TA opportunities and other resources for assistance with service line inventory and replacement requirements.

5.2 Pipe Surface Test

Simple pipe surface tests can determine service line materials for residents, if accessible. Pipe surface tests indicate lead presence on the pipe's surface but not inside, such as in lead-lined galvanized iron pipes. The tests include:

- A scratch test involves scratching the pipe surface with a coin or key; or
 - A shiny silver surface that flakes indicate lead.
- Using a magnet on the pipe surface;
 - If the magnet does not stick, the pipe may be lead.

The pipe surface test should be conducted in conjunction with visual inspection by the water system or customer self ID.

6. References

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Appendix A: Minimum Number of Service Lines Requiring Physical Investigations

Table 1: Minimum number of service lines requiring physical investigation to determine system-wide service line materials at 95% confidence level and 5% margin of error.

Total Number of Service Lines in the validation pool	Number of Investigations Needed ²⁷
<1,500	20% of unknowns
1,500 to 2,000	322
2,001 to 3,000	341
3,001 to 4,000	351
4,001 to 6,000	361
6,001 to 10,000	371
10,001 to 50,000	381
>50,000	384

Identify the Minimum number of investigations needed based on number of service lines in the SWSM or SPM Validation Pool(s) (From Step C)

The SWSM Validation Pool must:

- Include all NLRV and unknown service lines; and
- Not include any “Known” service lines

In the table to the left, find the number range under the “Total number of service lines in the validation pool” column that corresponds to the number of service lines in your SWSM Validation Pool (from step B of SWSM Process). The number to the right of that, is the minimum number of service lines that must be investigated (each at a minimum of 2 points) to achieve a statistical 95% level of confidence and 5% margin of error.

A SPM Validation Pool must:

- Include the targeted sites with NLRV and/or unknown service lines; and
- Not include any “Known” service lines

In the table to the left, find the number range under the “Total number of service lines in the validation pool” that corresponds to the number of service lines in your SPM Pool (From Step B of SMP Process). The number to the right of that is the minimum number of service lines that must be investigated (each at a minimum of 2 points) to achieve a statistical 95% level of confidence and 5% margin of error.

²⁷ The required number of investigations can be calculated for any combination of confidence level, margin of error, and number of unknown service lines using the formula for the sample size of a proportion of the population. This process uses the same formulas described in Section 3.5 of the Technical Support Document for the final LCRI, available at: <https://www.regulations.gov/docket/EPA-HQ-OW-2022-0801>.

Appendix B: Generating a Uniformly Random Set of Services Lines for SWSM Investigations (EGLE, 2024)

A spreadsheet (such as Microsoft Excel or Google Sheets) can be used to generate a uniformly random set of “unknown” locations for verification using the following steps:

1. In the first column of a spreadsheet, list every unique service location of “unknown” or Non-lead requiring validation. They can be listed by address, service line ID, or other identification method.
2. In the second column, generate uniformly random numbers, so that each service line is associated with a randomly generated number, using the following steps:
 - Enter the following formula in the second column: =RAND()
 - Put the ‘=RAND()’ formula next to each location.
 - This generates a number between 0 and 1 for each location.
 - Then select the column with the random values and use the spreadsheet’s “Copy” feature.
 - Then use the “Paste Special” option to “Paste Values Only” in the same column that you have already selected. This will ensure your random numbers remain static.
 - Then use the “Sort” feature to list the randomly generated numbers from lowest to highest. If the “Sort Warning” appears, select “Expand the selection,” then “Sort.”
3. Select only the top N homes, where N is the number requiring verification. For example, if you need to verify 20 locations, select the first 20 locations on the list. These are the 20 uniformly random locations requiring verification.

Source: *Michigan EGLE Minimum Service Line Verification Requirements*, (<https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/DWEHD/Community-Water-Supply/Lead-Copper/Minimum-Service-Line-Material-Verification-Requirements.pdf>) (EGLE, 2024).

Appendix C: Service Line Material Validation Tracking Tool*

Service Line Material Validation Tracking Information

Water systems must document the following information on service line material from physical verifications:

Location	Based on Historical Records	Based on Visual Inspection Verification
<p>For each service line:</p> <ul style="list-style-type: none"> Physical street address - House number, Street name, City, State and Zip Only if there is not street address, another location identifier may be used, where physical location can be identified (i.e., lat/longs, cross streets) 	<p>For each service line:</p> <ul style="list-style-type: none"> Material classification of each service line or portion of service line if ownership is shared (i.e., “unknown,” “non-lead”) Existing record(s) used to make the initial material classification (if any) 	<p>For each service line inspection point: (Minimum of two points, one per side if ownership is split):</p> <ul style="list-style-type: none"> Specific material(s) of service line (i.e., “copper”, “plastic”, “galvanized” “lead”) Method used to make visual inspection (i.e., hydro-vac, open cut excavation, inside building). Location point(s) that were visually inspected (i.e., at main, main – meter, at meter pit, meter-building, foundation, crawlspace)

****See example tracking sheet on next page***

Example Validation Tracking Tool Spreadsheet

Location Information		Service Line Material Based on Historical Records				Service Line Material Based On Field Investigation							
Unique Service Line ID	Street Address	Historical Record SL Material System-Owned Portion	Type of record	Historical Record SL Material Customer- Owned Portion	Type of record	Verified Material System-Owned Portion	Describe method used to make visual inspection	Enter the Date of Field Verification	Record accuracy assessment	Verified Material Customer- Owned Portion	Describe method used to make visual inspection	Enter the Date of Field Verification	Record accuracy Assessment
1	23 Main street	Non-Lead - Copper	Installation record (e.g., tap card)	Unknown	Installation record (e.g., tap card)	Non-Lead - Copper	Hydro-vac	10/31/2026	Accurate- Highly Reliable	Non-Lead - Copper	at connection with premise plumbing	10/31/2026	NA-Record cant be confirmed
2	60 1st Ave	Non-Lead	Affidavit	Unknown	No Record	Non-Lead - Copper	Hydro-vac	12/14/2026	Accurate- Highly Reliable	Non-Lead - Copper	at connection with premise plumbing	12/14/2026	NA-Record cant be confirmed
3	12 Boulder	Unknown		Non-Lead - Copper	Installation record (e.g., tap card)	Galvanized	Hydro-vac	8/4/2026	NA-Record cant be confirmed	Lead	at connection with premise plumbing	8/4/2026	Inaccurate- Very Unreliable (Lead/GRR discovered)
4	34 2nd Ave	Galvanized	Installation record (e.g., tap card)	Non-Lead - Copper	Service line repair/replacem ent (Before lead ban)	Non-Lead - Copper	Hydro-vac	4/27/2026	Accurate- Moderately Reliable	Non-Lead - Copper	at connection with premise plumbing	4/27/2026	Accurate- Highly Reliable
5	941 Walnut	Non-Lead - Copper	Meter replacement	Non-Lead	Affidavit	Non-Lead - Copper	Hydro-vac	11/12/2026	Accurate- Highly Reliable	Non-Lead - Copper	at connection with premise plumbing	11/12/2026	Accurate- Highly Reliable
6	23 North St	Galvanized	As built	Non-Lead - Copper	Installation record (e.g., tap card)	Galvanized	Hydro-vac	5/6/2026	Accurate- Highly Reliable	Lead	at connection with premise plumbing	5/6/2026	Inaccurate- Very Unreliable (Lead/GRR discovered)
7	26 Grand	Unknown	Installation record (e.g., tap card)	Unknown	Installation record (e.g., tap card)	Non-Lead - Copper	Hydro-vac	8/17/2026	NA-Record cant be confirmed	Lead	at connection with premise plumbing	8/17/2026	Inaccurate- Very Unreliable (Lead/GRR discovered)
8	13 24th St	Non-Lead - Plastic	Service line repair/replacem ent (Before lead ban)	Unknown	No Record	Lead	Hydro-vac	8/17/2026	Inaccurate- Very Unreliable (Lead/GRR discovered)	Galvanized	at connection with premise plumbing	8/17/2026	NA-Record cant be confirmed

Figure 2: Example Service Line Material Verification Tracking Tool

Appendix D: Glossary of Terms

Table 2: Service Line-Related Definitions/Descriptions

Term	Definition/Description
Connector	Also referred to as a gooseneck or pigtail, a connector is a short segment of piping not exceeding three feet that can be bent and is used for connections between service piping, typically connecting the service line to the water main.
Galvanized requiring replacement (GRR) service line	A galvanized service line that currently is or ever was downstream of a lead service line or is currently downstream of an unknown service line. If the system cannot prove otherwise, it must assume a lead line was upstream. Lines downstream of a lead gooseneck, pigtail, or connector are not GRR.
Galvanized service line	A service line that is made of iron or steel that has been dipped in zinc to prevent corrosion and rust (40 CFR § 141.84).
Lead service line (LSL)	The service line, in whole or in part, is lead; however, if only a lead gooseneck, pigtail, or connector is present, it is not classified as a lead service line.
Lead-status unknown service line (Unknown service line)	A service line whose pipe material has not been demonstrated to be a lead, GRR, or a non-lead service line.
Non-lead service line	The service line contains no "lead" or "galvanized requiring replacement," verified by approved evidence. The system may specify the material (e.g., plastic or copper) instead of "non-lead."
Service line	A service line is portion of pipe that connects the water main (or other conduit for distributing water to individual consumers or groups of consumers) to the building inlet. Where a building is not present, the service line connects the water main (or other conduit for distributing water to individual consumers or groups of consumers) to the outlet.

Table 3: Other related terms and definitions/descriptions

Term	Definition/Description
Building	Building refers to any occupiable structure, including commercial buildings and houses.
Community Water System (CWS)	A public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents (40 CFR § 141.2).
Consumer Confidence Report (CCR)	An annual water quality report that CWSs must provide to customers (40 CFR §§ 141.151-155; Subpart O).

Customer-owned	The service line portion not owned by the water system; "Customer" or "private" refers to any non-water system entity.
Curb stop	An exterior valve near the property line used to control water service to a building.
Non-Transient Non-Community Water System (NTNCWS)	A non-community water system serving at least 25 of the same people for six months annually (40 CFR § 141.2).
Public water system (PWS)	A public water system provides water for human consumption through pipes or conveyances, with at least 15 connections or serving an average of 25 people daily for 60 days a year. It is classified as either a community or non-community water system, excluding special irrigation districts. It includes all collection, treatment, storage, and distribution facilities under the system's control, as well as any external collection or pretreatment storage facilities primarily used by the system (40 CFR § 141.2).
Region 8	United States Environmental Protection Agency Region 8
State	The State refers to the agency of the State or Tribal government which has jurisdiction over public water systems. During any period when a State or Tribal government does not have primary enforcement responsibility pursuant to section 1413 of the Act, the term "State" means the Regional Administrator, U.S. Environmental Protection Agency. The EPA Region 8 is the Primacy Agency which has jurisdiction over public water systems in the state of Wyoming.
System-owned	The service line portion owned by the CWS and NTNCWS, also known as "public."
System with a single service line	A system which supplies drinking water to consumers via a single service line.
Water main	A conduit that delivers water to a connector or customer's service line, typically located underground in residential areas.
Water meter	A device, mechanical or electronic, that records the water quantity passing through a pipeline or outlet.
40 CFR Part 141	The National Primary Drinking Water Regulations (NPDWRs) are in 40 CFR Part 141 of the Code of Federal Regulations, setting enforceable standards for public water systems.

Appendix E: Service Line Inventory Requirements Under LCRI

The service line inventory provides a foundation for water systems to address significant sources of lead in drinking water and in lead and GRR service lines. Table 4 provides a summary of the service line inventory-related requirements under the LCRI.

Table 4: LCRI Service Line Inventory Requirements

Requirement	Description
Baseline Inventory	<ul style="list-style-type: none"> The baseline inventory expands on the initial inventory with updated details on connectors and service line materials and locations. Systems must review information sources to categorize connectors as "Lead," "Non-lead," "Unknown," or "No connector present." The baseline inventory is due by November 1, 2027.
Identification of unknown service lines	<ul style="list-style-type: none"> Water systems must identify the material of all unknown service lines by the mandatory replacement deadline.
Updated Inventory	<ul style="list-style-type: none"> The inventory should be continuously updated as systems replace lead and GRR lines and identify unknown materials. By January 30, 2029, and annually thereafter, water systems must update and post their inventory online, detailing counts for each service line material, known lead connectors, unknown material connectors, and replacements made in the past year. Systems with all non-lead lines need not submit or post updates unless lead or GRR lines are found during validation.
Validation of non-lead service lines	<ul style="list-style-type: none"> To assess inventory accuracy, water systems must validate a subset of their non-lead service lines no later than December 31, 2034, or on a schedule specified by the State. Water systems that completed validation efforts before November 1, 2027, that are at least as stringent as the LCRI requirements can request a waiver from the State.
2021 Lead and Copper Rule Revisions (LCRR) Initial Inventory	<ul style="list-style-type: none"> The LCRI retains the requirements from the 2021 Lead and Copper Rule Revisions (LCRR) to develop and submit an initial inventory by October 16, 2024. This inventory must include all service lines, regardless of ownership status. Service lines must be categorized as lead, non-lead, GRR, or unknown.