Identification of Service Line Materials
Methods and Verification Processes

New Hampshire community and non-transient non-community public water systems (PWS) are required to develop a complete an inventory of all service lines to comply with the United States Environmental Protection Agency (EPA)'s 2021 Lead and Copper Rule Revision (LCRR). All service lines must be inventoried (regardless of ownership) including fire and domestic water lines. Service line inventories must be submitted to the New Hampshire Department of Environmental Services (NHDES) using the NHDES Service Line Inventory Template which is the required form of submittal. Inventory submittals are due to NHDES by the federal deadline of October 16, 2024.

Developing a service line inventory requires PWSs to record the methods and verification processes used when classifying service line materials. Service line identification methods are defined as the sources of information that help a PWS designate the material of a service line. Verification processes are defined as the combination of methods used to produce a high confidence level in the designation of a service line material.

The purpose of this document is to provide guidance on the processes involved with determining service line materials by outlining the acceptable methods of identifying service line materials per LCRR, discussing additional approved methods of identification per NHDES such as statistical analysis, and explaining the processes used to verify information.

Table of Contents

Terms and Definitions

Public water system (PWS): A system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year.

Community (C) water system: A public water system that serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

Non-transient non-community (NTNC) water system: A public water system that is not a community water system and regularly serves at least 25 of the same persons over six months per year.

Curb Stop: An exterior valve located at or near the property line that is used to turn on and off water service to the building.

Lead and Copper Rule Revision (LCRR): A federal requirement per EPA effective December 2021. This rule requires C and NTNC water systems to develop an inventory of all service lines, create replacement plans as needed and submit to the primacy agency.

Lead and Copper Rule Improvements (LCRI): a federal proposal per EPA effective November 30, 2023 and published on the federal register December 6, 2023. LCRI may have implications to the requirements of LCRR which will be communicated to PWSs as necessary.

Service line: The pipe connecting the water main to the interior plumbing in a building. The service line may be owned wholly by the water system or customer, or in some cases, ownership may be split between the water system and the customer.

Unknown service line: A service line where there is no documented evidence supporting material classification.

Known service line: a service line where the pipe materials are categorized using records or other means. Lead service lines are defined as a service line where the pipe material is lead and/or GRR which is defined as any portion of galvanized pipe that is or was ever downstream of a lead component.

Lead service line: A portion of pipe that is made of lead, which connects the water main to the building inlet. A lead service line may be owned by the water system, owned by the property owner, or both. GRR and Unknown service lines are assumed to be lead until proven otherwise.

Galvanized requiring replacement (GRR): A service line comprised of galvanized steel that is or was at any time downstream of a lead service line or is currently downstream of a lead status unknown service line. If the water system is unable to demonstrate that the galvanized service line was never downstream of a lead service line, it must presume there was an upstream lead service line.

Non-lead service Line: NHDES has three classifications of non-lead service lines: Non-lead Plastic, Non-lead Copper, and Non-lead other. A service line that is determined through an evidence-based record, method, or technique not to be lead or galvanized requiring replacement.

Service line identification methods: the sources of information that help a PWS designate the material of a service line.

Statistical analysis: a NHDES-approved alternative method of service line identification that may be considered in the absence of full or detailed records. It includes visual inspection of 20% of a water system's unknown service lines, the list of unknown services lines selected for visual verification need to have been randomly generated using the methods NHDES has outlined in *Statistical Guidance for Identifying Service Lines*.

Visual Inspection: a documented observation of a service line material made by a present PWS staff or affiliated third party representative due to the requirement of LCRR/LCRI.

Verification Processes: the combination of methods used to produce a high confidence level in the designation of a service line material.

Visual inspection certification statement form: A statement from a past or present PWS staff or affiliated third party representative of past visual inspection of the service line with no written documentation of that inspection.

Water main: A pipe that conveys water to a connector or customer's service line. In residential areas, it is usually located underground.

Water meter: An instrument, mechanical or electronic, used for recording the quantity of water passing through a particular pipeline or outlet.

Service Line Identification Methods

EPA's LCRR was released in 2021 and requires community and non-transient non-community PWSs to conduct a records review using the sources of information described below. Information pertaining to the service line material and installation date of the service line will be among the most useful pieces of information in designating a service line material.

Please note that NHDES requires that at least two methods be used from the records review process before designating a service line material. Using multiple methods in the records review process provides a high confidence level in the service line material designation and therefore verifies the data. Verification processes are the combination of methods used to produce a high confidence level in the designation of a service line material. *Verification Processes* are outlined in this document.

Acceptable Methods of Identifying Service Line Material

(a) All construction and plumbing codes, permits, and existing records or other documentation which indicates the service line materials used to connect structures to the distribution system.

(b) All water system records, including distribution system maps and drawings, historical records on each service connection, meter installation records, historical capital improvement or master plans, and standard operating procedures.

(c) All inspections and records of the distribution system that indicate the material composition of the service line connections that connect a structure to the distribution system.

(d) Any resources, information, or identification method provided or required by the state to assess service line materials.

(e) Documentation indicating post-1989 construction date (house or water system).

(f) Pipe installation records or similar documentation indicating service line diameters.

(g) Visual inspection

(h) Visual inspection certification statement form. *

(i) Statistical analysis. *

*NHDES is accepting these methods of identifying service line material. Please note EPA may require additional visual inspection per Lead and Copper Rule Improvements (LCRI). NHDES will advise as more information is released.

Visual Inspection

Visual inspection is an acceptable method of identifying a service line material. Visual inspection is a documented observation of a service line material made by a present PWS staff or affiliated third party representative due to the requirement in LCRR/LCRI.

NHDES determines visual inspections to produce the highest level of confidence in designating a service line material. Visual inspection is the only stand-alone method that does not require additional identification methods be used to designate a service line material.

Examples of visual inspection include, but are not limited to one or more of the following:

(a) Service line photographs taken by PWS staff or homeowner.

(b) Visual inspection observed via test pits and/or potholing.

(c) Results from the NHDES Protect Your Tap Tool or a similar tool that are supplemented with a decipherable photograph.

Verification Processes

Verification processes are defined as the combination of methods used to produce a high confidence level in the designation of a service line material. NHDES requires at least two methods of information that must be used including, but not limited to, a combination of the methods described in (a) through (i) *Acceptable Methods of Identifying Service Line Material*. NHDES determines one form of a visual inspection on each side of the service line to produce the highest level of confidence in the data and does not require additional methods be used.

Below are examples of a combination of acceptable verification processes used to verify a service line material. See *Appendix A* for additional examples. Please note this list is not exhaustive and if other questions arise, please contact NHDES.

Example 1: Post 1989 construction date records + as-built drawings where the entire service line material is identified as a non-lead material.

Example 2: Meter replacement records where the utility portion of the service line material is identified + record drawings showing the customer portion of the service line was built in 1995.

Example 3: Operator certification statement using the NHDES Visual Inspection Certification Form indicating all services lines were installed in 1990 with a non-lead material. Additional visual inspection may be required per EPA.

Statistical Guidance for Identifying Service Lines

NHDES is accepting statistical analysis for communities of no known lead or galvanized requiring replacement (GRR). Statistical analysis is an alternative method of service line identification and should only be used by PWSs following a records review process noted in (a) through (f) *Acceptable Methods of Identifying Service Line Material* described in this document. The Lead Service Line Inventory Template should be filled out accordingly if statistical analysis method is used.

The statistical analysis approach provides a method to complete a service line inventory for communities with no known lead or GRR, reducing the need to validate every unknown service line via visual inspection. The water system's statistical approach will need to demonstrate a minimum of 95 percent level of statistical confidence. A key factor in the success of this strategy is the use of a randomly generated list of unknown service lines to be visually inspected.

Identification Process

Before using the statistical approach to identify unknown service lines, the PWS is required to first use other approved methodologies as described in (a) through (f) *Acceptable Methods of Identifying Service Line Material* (records review, including post-1989 construction, larger pipe diameters and optionally, customer data, etc.) to categorize service lines. If no lead service lines are identified using those methodologies, or in the absence of full and/or detailed records, a statistical approach may be used. Statistical analysis may be used for a subset of service connections within a PWS that have data to support the assumption of non-lead service lines.

A PWS that decides to use statistical analysis must have at least one source of information that deems their PWS service lines as Non-lead. Examples include, but are not limited to:

- Post 1989 construction of the water system or the house.

- As-built drawings and/or record drawings where a portion of the service line material is identified.
- Meter replacement records where a portion of the service line material is identified.

Note: If ANY service line is found to be a lead service line, then the statistical method for determining unknowns may not be used. If you are unsure whether statistical analysis should be used, consult NHDES to assure this method of verification is appropriate for your water system.

Statistical Analysis Method

Follow the steps below to ensure the statistical analysis method is being performed in accordance with NHDES procedures.

Step 1: Identify all service lines of unknown material.

Identify all water service lines that could not be categorized using another approved methodology. Determine the total number of these partially or fully unknown service lines.

Step 2: Identify how many service lines must be physically inspected.

All PWSs must physically verify at least 20 percent of the total number of unknown lines, reaching a minimum of 95 percent confidence level.

Step 3: Randomly select service lines for physical inspection.

Using the list of unknown service lines identified in Step 1 and the number of service lines needing physical identification in Step 2, use the process described in *Generating a Uniformly Random Set of Service Lines for Inspection* to randomly select service lines to be physically inspected. Selection must be uniformly random and not selected based on any specific criteria which can introduce bias. In other words, each unknown service line must have an equal chance of being chosen for verification.

Note: It may be tempting to introduce a "logic" to the site selection process, such as selecting within periods of construction or targeting older portions of town. However, doing so can unintentionally bias the data set. A truly random selection method described in *Generating a Uniformly Random Set of Service Lines for Inspection,* is required to be used.

Step 4: Conduct a two-point (or more, if needed) physical inspection.

At least one-point physical identification is required for each portion of unknown service line. If the service line is jointly owned, each portion that is unknown (public and/or customer) must be inspected. Physical identification methods include excavation, televising, in-home inspections, and other emerging methods and must be conducted or overseen by water system personnel. If inspecting near the meter, ensure the observed material is the actual service line and not part of the metering components. If the entire service line is owned by the utility visual inspection of each end of the service line is still required if a curb stop is present. Visit *EPA's webpage on Planning and Developing a Service Line Inventory* and refer to the "Guidance for Developing and Maintaining a Service Line Inventory" Chapter Five for examples of service line identification methods.

If one or more of the original randomly selected sites cannot be physically inspected, the PWS must replace it by selecting the next service line on the randomly generated list.

Step 5: Enter results of the physical inspection process.

In the NHDES inventory spreadsheet, enter in the information gained from the physical inspection of the service lines.

In the System-Owned Portion of the service line inventory:

- *Column I* (System-owned Service Line Material Classification): use the drop-down menu to select the service line material.

- *Column K* (Additional Material Classification Details): select from the drop-down menu to specify the material observed.

- *Columns M (Service Line Size) - Column Q (Date of Field Verification):* use each drop-down menu to select the appropriate answer based off the physical inspection of each service line.

- *Column R* (Notes): add any additional notes regarding methods, observations or details regarding the service line material.

Fill in the above information for the corresponding columns in the Customer-Owned Portion of the service line inventory. Once you are done, *column AB* (Entire Service Line Classification) will auto populate. Make sure that *column AJ* (Assigned Sample Tier) is also filled out for each service line.

Step 6: Enter results for unknown service lines.

In the NHDES inventory spreadsheet, enter in the information for both the Utility-Owned and the Customer-Owned portion of the service line assumed for the service lines that were <u>not</u> physically inspected.

- *Column I and S* (Service Line Material Classification): select the Non-Lead-Other option from the drop-down menu.

- *Column N and W* (Basis of Material Classification): select Predictive Model from the drop-down menu.

- *Column R and column AA* (Notes): add any additional notes regarding methods, observations, or details regarding the service line material.

Step 7: Retain identification records.

Create, compile, and retain documentation of all service line identification efforts. NHDES may ask PWSs to produce or submit these records.

Note: EPA may require <u>additional</u> visual inspection per Lead and Copper Rule Improvements (LCRI). NHDES will advise as more information is released.

Generating a Uniformly Random Set of Service Lines for Inspection

Generating a uniformly random set of service lines for inspection is required for any non-EPA approved method of service line identification. Statistical analysis and the Visual Inspection Certification Statement Form are NHDES-approved methods for identifying service line materials. These methods require 20% visual inspection of service lines in addition to any visual inspection previously stated in each method.

The selection of the service line inspection sites must be uniformly random and not selected based on any specific criteria which can introduce bias. In other words, each unknown service line must have an equal chance of being chosen for inspection. Below are steps on generating a uniformly random set of service lines for inspection.

A uniformly random set of locations of unknown service lines for inspection can be generated using a spreadsheet (such as Microsoft Excel or Google Sheets). Use the following Microsoft Excel steps (the same formulas and method work for Google Sheets):

1. In the first column of a spreadsheet, list every unique service line of unknown material. 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. Follow these steps:

   a. Enter the formula =RAND() into the second column next to each location and press Enter. This generates a number between 0 and 1 for each service line.

   b. Select the second column (the column with the random values) and copy it, using the spreadsheet's Copy feature.

   c. With the second column still selected, use the Paste Special option to Paste Values Only into that same column. This will ensure your random numbers remain static.

   d. 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 service lines, where N is the number requiring inspection. For example, if 20 service lines need to be inspected, select the first 20 service lines on the list. These are the 20 uniformly random service lines to be inspected.

Appendix A: Service Line Material Identification Using Acceptable Verification Processes

Verification processes are the combination of methods used to produce a high confidence level in the designation of a service line material. NHDES requires multiple methods to be used.

This appendix describes real world examples of scenarios PWSs may encounter during the records review process of developing service line inventories. Depending on what PWS records are available, this will determine what additional identification method(s), if any, may be required.

The list of examples in this appendix is not exhaustive. If additional information is needed when verifying service line information, please contact NHDES.

Example 1: Mobile home park with limited information.

New distribution system installed in 2011 and the service line material of PVC is noted on the construction plans. The homeowner owns the portion of service line underneath the home (unknown material), from the interior plumbing to the ball valve where the PVC service line connects. There is no information on when the home was built. The utility side of the service line would be classified as Non-Lead-Plastic. The customer side of the service line would be Unknown.

Methods used: (1) construction plan indicating post-1989 construction of the water system and utility portion of service line material. No information is available on when the houses were installed or what the material is on the customer side of the service line. Overall classification of the entire service line would be Unknown.

Example 1A: Same conditions as above except the home was built in 1995. No information on the service line material exists. The customer-owned portion would be classified as Non-Lead-Other.

Methods used: (1) post-1989 construction of the water system; (2) post-1989 construction of the mobile home. Overall classification of the entire service line would be Non-lead.

Note: Mobile home parks have many different scenarios and may have different designations of ownership. Ownership is usually identified at curb stop or at the ball valve. For additional assistance for how mobile home parks should be represented in the service line inventory, please contact NHDES.

Example 2: Single-family homes with Visual Inspection Certification Form.

The service line ownership is split at the curb stop. The customer owns from the home to the curb stop, and the utility owns from the curb stop to the water main. There were no records for the customer-owned portion of the service line, but the customers took pictures of their service lines and sent it to the utility (visual inspection) and found it to be copper. The customer-owned portion of the service line would be classified as Non-Lead Copper. The water system has no records for the utility-owned portion of the service line. The water system operator has been working at this system for many years and saw all the service lines get installed. The operator makes a statement using the Visual Inspection Certification Form to attest that all utility-owned service lines were installed in the 1990s and are copper. To classify the utility-owned portion of the service line as Non-Lead-Copper, 20% visual inspection is required per EPA. Once 20% of utility-owned service lines are visually inspected at random (using NHDES guidance to create the random list) the utility-owned portion of the service line can be classified as be Non-Lead-Copper.

Methods used: (1) visual inspection of customer-owned portion of service line via homeowner photograph. (2) Operator statement using the Visual Inspection Certification Form. EPA requires 20% visual inspection for all non-EPA approved methods. After 20% visual inspection is completed on the utility-owned portion of the service line, the overall classification of the service line would be Non-lead.

Example 3: Townhouse with records dated prior to New Hampshire lead ban date.

There are multiple buildings with three townhouses per building. The entire service line is owned by the water system. Each townhouse has a separate service line entering through the basement. The utility has a record indicating the year the system was built (1980) and an as-built drawing showing the water main as PVC and by-laws saying that PVC was the only material ever put in the ground. Statistical analysis is used to prove the presence of PVC service lines. In In the NHDES Service Line template, lines visually inspected per statistical analysis are classified as Non-Lead Plastic. The basis of the material classification is Other. Lines that were not visually inspected but were proved non-lead through statistical analysis are classified as Non-Lead Plastic. The basis of the material classification is "predictive modeling." Additional visual inspection may be required per EPA.

Methods used: (1) water system by-laws confirming PVC material; (2) statistical analysis confirming non-lead material (may require additional visual inspection per EPA). Overall classification of the service line would be Non-lead.