White Paper
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Developing Lead Service Line Inventories
Presented by the Association of State Drinking Water Administrators

Summary: Many state drinking water administrators are considering developing inventories of the materials used in service lines that are part of the distribution systems of community water systems (CWSs) they regulate. Some states have already conducted voluntary or mandatory surveys of CWSs whether on their own or in response to state legislation. Others are preparing to use the information in the next round of Drinking Water Infrastructure Needs Survey and Assessments (DWINSA) that the Environmental Protection Agency (EPA) is developing pursuant to Section 2015 of the America's Water Infrastructure Act of 2018. The 2020 DWINSA will include an estimate of the number of public and private lead service lines as well as an estimate of the costs to replace all lead service lines, which will be a significant undertaking for water systems to develop and states to collect information on. To assist states that are considering initiating a lead service line (LSL) inventory, the Association of State Drinking Water Administrators (ASDWA) has developed the following guidance based on the experience of the states that have already conducted or are preparing to develop a comprehensive inventory of service line materials. It is important to note that not all of these recommendations may be feasible for a state to carry out during development and implementation of a state LSL inventory, however ASDWA advises states consider the following elements when designing a LSL inventory.

Additionally, there are numerous service line configurations that may involve some lead components, such as partial lead service lines, pigtails, etc. Similarly, guidance should be provided about how to account for and capture lead service line components in the inventory efforts.

Background: In 2016, the American Water Works Association published the results of a survey it conducted in 2013 of CWSs. The report estimated the number of LSLs in each state grouped by size of CWS. In response to a February 2016 letter from EPA, several states (IN, MA, NC, and WA) conducted voluntary surveys of CWSs and some others requested that CWSs submit or update their service line materials required under Lead and Copper Rule (LCR) (AL, LA, KS, and TX). Two states (CA and OH) required CWSs to submit maps showing where LSLs are likely to be located.

Currently, four states (CA, IL, MI, and WI) require CWSs to provide summaries of their service line materials. See Table 2 for details of the materials included in their reporting. All four states use a website to streamline the process and have integrated reporting into their annual reporting system.

- The **Wisconsin Public Service Commission (PSC)** has been the leader in requiring reporting for the portion of the service line owned by regulated CWSs since 2004. As part of its annual report, each CWS must report through an online portal the number of service lines for each material

type (grouped by diameter). In 2018, the PSC extended the requirement to include reporting for the portion of the service line not owned by the CWS. The PSC provides guidance to regulated CWSs and makes the information available through separate webpages for municipal/sanitary districts and investor-owned utilities.

- The **Illinois Environmental Protection Agency (IEPA),** pursuant to state legislation, requires CWSs to report their number of service lines, grouped by materials, beginning in April 2018 and annually thereafter through an online portal. Utilities may report "unknown" or "unknown not lead" (in 2019). The counts are based on the entire service line, including the portion on private property. IEPA provides guidance to CWSs and makes the data available online.

- The **California Water Board**, pursuant to state legislation, requires CWSs to submit a preliminary service line materials inventory in 2018 and comprehensive inventory in 2020 through an online portal. The state legislation limited the scope of the requirement to the portion of the service line between the main and the meter, excluding the portion between the meter and the building. In 2018, CWSs were required to report the number of service lines grouped by material type (including an option for unknown) and provide a total length of lines of each material in addition to a map indicating where the service lines were generally located. The Board only requests a map if the water system has LSLs. Legislation also requires any water system with LSL, including lead goose necks, to provide a plan for replacement of LSLs by July 1, 2020. The plan for replacement does not have a statutory end date. The legislation also requires any line of unknown material to be included in the plan to replace the service line as to encourage water systems to investigate their unknown lines. As of July 2019, the Board has not received any LSL replacement plans. The Board provides guidance to CWSs and makes the data available online.

- The **Michigan Department of Environmental Quality (MDEQ),** pursuant to its revised LCR, requires CWSs to submit a preliminary service line materials inventory in 2020 and comprehensive inventory in 2025 through an online portal. In 2020, CWSs will be required to report the number of service lines grouped by material type (including an option for unknown). MDEQ also requires CWSs to provide qualitative assessments of the sources of information uses, level of confidence in those sources, likelihood of finding discrepancies in the data, and composition of LSLs. MDEQ provides guidance to CWSs and anticipates making the data available on-line through its webpage on its rule.

In addition, three states (IN, MA, and WA) conducted voluntary surveys of CWSs in 2016 that may serve as good examples for other states. Indiana posted the survey forms in an on-line virtual file cabinet. Massachusetts went a step further and published a report. Washington State went a step further, conducting follow-up interviews with CWSs to refine the estimates and published several reports.

It's important to recognize that there may be significant barriers to a state developing a mandatory lead service line inventory. A voluntary survey may be the most attainable option for some states. When a state cannot develop a mandatory reporting requirement for lead service lines, ASDWA recommends states move forward with a voluntary survey. Voluntary programs can still provide good data on lead service lines. Well-constructed and well-implemented voluntary programs using these best practices, can have a high CWSs response rate covering over 90% of service lines, as is the case with Indiana and Washington's surveys.

Guidance: State drinking water administrators should consult with their peers who have already conducted surveys to understand any lessons they may have learned. As of August 2019, ASDWA would recommend states consider the following:

- **General Recommendations – States should:**
  - Enable CWSs to submit information through an online portal.
  - Ask CWSs to identify materials of the entire service line and include who owns which portions of the service line, the utility or the customer, and the legal basis for that determination. If the ownership is split, then identify where along the line the change occurs.
  - Provide a means to address uncertainty of service line material via quantitative or qualitative probability due to the great deal of uncertainty for many water systems about the number and/or location of lead service lines.
  - Provide detailed guidance on how to account for and capture lead components of a service line in the inventory efforts due to the numerous service line configurations that may involve some lead components, such as partial lead service lines, pigtails, goosenecks, and solder.
  - Especially in the first round of any reporting, follow-up with CWSs that fail to report and analysis the information submitted to identify potential reporting errors or inconsistencies.
  - Make the reports submitted by individual CWSs publicly available through a user-friendly online portal and indicate those CWSs that have not submitted a report.
  - Provide an option to download all reports submitted in a single file.
  - Develop the capability to readily generate summary reports in event of media or public inquiries.

- **State already requires CWSs to submit annual reports for other purposes:** The state should consider modifying the existing reporting requirement to include counts of service lines grouped by each type of material commonly used. If possible, CWSs should submit the information through an online portal to streamline the process and simplify analysis.

- **State DOES NOT already require CWSs to submit annual reports**: The state should conduct an initial voluntary survey to be able to assess the situation and develop more useful estimates than may already be available. After evaluating the results, the state can determine whether additional reporting is needed. Based on the experience in three states, smaller CWSs are much less likely to respond to the survey than large and medium ones, but information should still be useful since the responses should cover the majority of service lines in the state. If allowed by the state law, there are a number of survey tools, such as Survey Monkey, that can simplify data collection. Another option is to collaborate with other organizations such as a state university or the state section of the American Water Works Association to conduct the survey.

- **Preliminary versus comprehensive reporting:** A state without annual reports may consider requiring a one-time, preliminary inventory report followed by a comprehensive inventory report a few years later. The comprehensive report would generally expect that service lines of unknown material included in a preliminary report would be estimated as containing or not containing lead. This approach will help the state be prepared to submit an accurate assessment of future SRF needs and potential challenges. However:

  - A comprehensive report will focus resources on resolving unknowns instead of on replacing the LSLs where they are known to be used.
  - An annual report, if part of a regular reporting requirement, will focus attention on making steady progress in replacing LSLs and in resolving the identity of unknown service lines.

- **Voluntary versus mandatory reporting:** The survey, whether mandatory or voluntary, should collect counts of each type of material in the service lines. The survey should address the elements described in Table 1 and states should consider including the following:
  - Cover both the portion on public and private property and do not require separate counts of each.
  - Including the reporting of lead fittings such as goosenecks separately from lead pipe since those can typically be replaced with less disruption to customer's property.
  - Require reporting of galvanized steel lines that were previously connected to lead pipes separately from other galvanized lines because the former is more like to be a significant source of lead particulate. Presume lines installed before 1986 were connected to lead pipes.
  - Require separate reporting of copper lines with leaded and non-leaded solder because leaded solder poses a greater risk than the later. Presume lines installed before 1986 used leaded solder.
  - Require reporting of common types of other metal and plastic service lines in order to be prepared for future assessments. Consider grouping cast iron by year installed to better estimate potential replacement needs.
  - Allow reporting of service lines where the materials are unknown but separate unknowns into those likely and not likely to contain lead pipe and those with unknown fittings such as goosenecks.
  - Allow CWSs to identify additional materials to accommodate less common materials in order to identify potential changes to reporting in future years and anticipate potential problems.

- **Specialized reporting:** There are instances where the state should consider collecting information from targeted set of CWS. Some examples include:
  - Requesting the information before a CWS begins its periodic cycle of lead in drinking water monitoring. This information will enable the state to better assess the testing results and provide better guidance to CWSs.
  - Requesting CWSs to submit updated versions of the inventories already required under the state's version of the LCR and making those publicly available. This approach will help identify CWSs that are not using the initial inventory to guide the sampling effort.

- **Implementing an inventory in phases:** due to resource constraints or to give additional time to certain water systems, a state may consider phasing in a lead service line inventory with staggered dates for submitting inventories.
  - Setting interspersed submission dates for systems, perhaps based on size, could help a state balance the inflow of information with available staffing resources.
  - Staggering submission dates could also allow a state to grant more time to large systems that have large distributions systems or to small systems that typically have less established asset management and inventory information to provide their inventories to

the state. An evaluation of the regional or local situations will be needed to determine how to set the phases of submission deadlines.

- **Annual reporting versus bi- or tri-annual reporting:** although an initial submission date with an annual opportunity for systems to update their inventory is ideal, it may not be practical for every state.
    - Balancing state water program resources with the large quantities of data voluntary or mandatory inventory reporting will generate may mean reducing the reporting cycles for updates to a bi- or tri-annual basis.
    - In other states, there may be the desire and resources for a system to update their inventory with the state more often than once per year.
    - ASDWA encourages states to use a method that works best for their resource availability and priorities.

State Resource Needs for LSL Inventory: In many states, developing and implementing a LSL inventory will be a resource intensive project. Reporting through an online portal and delivering content via a website may pose significant barriers to some states, particularly when IT and computer services are centralized within the state. The California Water Board used a small committee of employees from the drinking water program, GIS team, and electronic annual report team and estimates over the two years of development and implementation that they have spent 1800 to 2700 hours of staff time, or the equivalent of 1.0 to 1.5 full time employee (FTE) annual hours on their LSL inventory over about 2 years. There are ways to minimize the burden on state staff, as mentioned above. Because Wisconsin modified an existing form and mechanism, the resources to develop and maintain the inventory have been minimal. However, Wisconsin is in a unique position since the PSC works with both public and private utilities, where in most states the public utility or service commissions only work with private water utilities.

Table 1: Recommended service materials for states to consider including in inventory reports

Material	Source	Comment
Lead		
Lead (any portion)	CA, IL, MI, WI	
Lead fittings NOT on a lead pipe (e.g., goosenecks, pigtails, and corporation stops)	CA	
Lead fittings ON a lead pipe (e.g., goosenecks, pigtails, and corporation stops)	CA	
Galvanized (previously connected to lead)	MI (CA, IL, WI)	Could base on age
Metal (not lead)		
Copper non-lead solder	IL	Could base on age
Copper lead solder	IL	Could base on age
Unlined cast iron (pre-early 1950's)	WI	Could base on age
Lined cast iron (mid-1950's to early 1970)	WI	Could base on age
Lined ductile iron (late 1960's to present)	WI	Could base on age
Other metal	WI	Could allow utility to name
Plastic		
High density polyethylene (HDPE)	CA, WI	
Polyvinyl chloride (PVC)	CA, WI	

Polyethylene (PE)	CA	
Polybutylene (PB)	CA	
Other plastic	WI	Could allow utility to name
Other		
Asbestos-Cement (transite)	WI	
Other material	CA	Could allow utility to name
Unknown		
Unknown - likely contains lead	CA	
Unknown - likely does NOT contain lead	CA, IL, MI	
Fittings of unknown material (e.g., goosenecks, pigtails, and corporation stops)	CA	

Table 2: Service line materials inventory reporting based on states with mandatory reporting of lines				
Material	Wisconsin (2014-19)	Illinois (2018-19)	California[1] (2018)	Michigan (2020)
Lead				
Lead (any portion)	X	X	X	X
Lead fittings NOT on a lead pipe (e.g., goosenecks, pigtails, and corporation stops)			X	
Lead fittings ON a lead pipe (e.g., goosenecks, pigtails, and corporation stops)			X	
Galvanized steel	X	X	X	
Galvanized (previously connected to lead)				X
Metal (not lead)				
Copper	X		X	
Copper non-lead solder		X		
Copper lead solder		X		
Steel	X			
Galvanized (not previously connected to lead)				X
Ductile iron			X	
Ductile iron (cast)		X[2]	X	
Unlined cast iron (pre-early 1950's)	X			
Lined cast iron (mid-1950's to early 1970)	X			
Lined ductile iron (late 1960's to present)	X			
Other metal	X			
Plastic				
High density polyethylene (HDPE)	X		X	
Polyvinyl chloride (PVC)	X		X	
Polyethylene (PE)			X	
Polybutylene (PB)			X	
Plastic		X		
Other Plastic	X		Y	
Other				
Asbestos-Cement (Transite)	X	X[2]	X	
Concrete	X			
Unknown				
Unknown Material		X	X	X
Unknown Not Lead		X		
Unknown - Likely Contains Lead				X
Unknown - Likely Does Not Contain Lead				X
Fittings of unknown material (e.g., goosenecks, pigtails, and corporation stops)			X	

[1] Also allows utilities to identify other materials
[2] Combined cast ductile iron and transite into one option.