



# **Strategies to Obtain Customer Acceptance of Complete Lead Service Line Replacement**



**American Water Works  
Association**

The Authoritative Resource on Safe Water <sup>SM</sup>

*Advocacy  
Communications  
Conferences  
Education and Training  
Science and Technology  
Sections*



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Association**

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# Strategies to Obtain Customer Acceptance of Complete Lead Service Line Replacement

## EXECUTIVE SUMMARY

AWWA supports replacement of lead service lines that significantly contribute to high lead levels in the home. Lead service lines can be a significant source of lead in tap water and, on the surface, complete lead service line replacement may be prudent. However, replacement is complicated by the ownership of the service lines. In some instances, the water utility owns the entire line. In others, the property owner owns the entire service line. And in still other cases, part of the service line is owned by the utility and part by the property owner. A public water system has no legal means to compel a property owner to replace a lead service line or portion of a lead service line. As a result, many water utilities that have replaced lead service lines have replaced only that segment that is under their control or ownership, in a practice commonly referred to as partial lead service line replacement.

Recent unpublished data indicates that partial lead service line replacements may substantially increase lead levels. A potential solution is replacement of the entire lead service line, an approach that often requires approval from the homeowner to replace their service line. Most customers are reluctant to agree to service line replacement on their property because of the cost, inconvenience and property damage that may result from the replacement procedure. This has

caused utilities to develop innovative approaches to obtaining customer acceptance for complete replacement. This paper documents proven utility experiences with complete lead service line replacement.

Implementing a comprehensive lead service line replacement program targeting complete lead service line replacement can represent a major undertaking for many utilities. The specific costs will be site specific, depending on how extensive lead service lines were used in a public water system's service area, how existing distribution system maintenance procedures will need to be modified, how engaged the water system is in ongoing outreach programs with the relevant service areas, and other factors. Consequently, this document focuses on describing key elements of successful complete lead service line replacement programs so that readers can consider these elements when evaluating how to most cost effectively pursue local complete service line replacement program development.





# Strategies to Obtain Customer Acceptance of Complete Lead Service Line Replacement

## INTRODUCTION

Service line ownership is variable among water utilities. Examples of service line ownership include:

- the water utility owns the entire service line
- the property owner owns the entire service line
- part of the service line is owned by the utility and part by the property owner

In the partial ownership scenario, the configuration typically consists of a utility-owned segment that extends from the water main to a curb stop and a customer-owned segment that extends from the curb stop to the property owner's residence or building. An example of this configuration is illustrated in Figure 1.

Many of the service lines owned by utilities, principally those located in the Northeast and Midwest, are composed of lead piping. AWWA considers it to be prudent to replace lead service lines that contribute significantly to high lead levels in the home, in their entirety. As might be expected, property owners are generally reluctant to replace the service line on their property

because of the cost, inconvenience and potential for property damage that can result from the replacement procedure.

The objective of this paper is to document the tools and practices that utilities are using to successfully overcome property owner reluctance and obtain property owner acceptance/investment for replacement of the lead service line on their property.

## Overview

The issue of lead in drinking water has returned to the national spotlight after a decade of relative calm. Water utilities have generally been very successful in implementing effective corrosion control programs and in complying with the requirements of the Lead and Copper Rule. In spite of this, utilities are facing renewed regulatory, legislative and public scrutiny, attributable largely to the discovery of elevated levels of lead in the tap water in a few high profile communities.

Recent unpublished data indicates that partial lead service line replacements may substantially increase lead levels. While many utilities have replaced the lead service lines under their

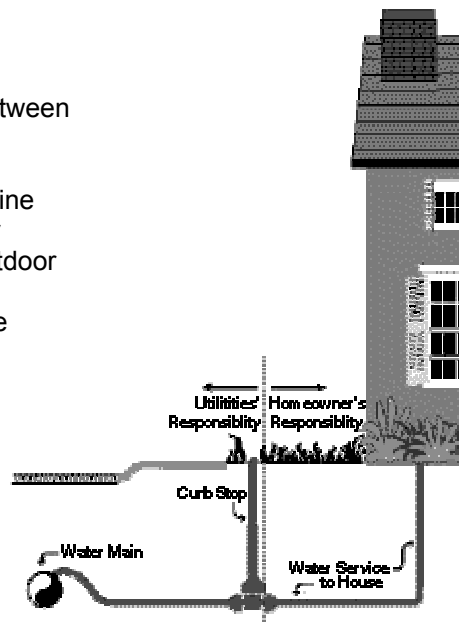
ownership/control, it is prudent to consider replacement of the entire lead service line as a means to reduce exposure to lead in drinking water.

This document summarizes the regulatory requirements of the Lead and Copper Rule as it pertains to lead service line replacement. It documents the industry's service line replacement practices and presents a strategy to obtain customer acceptance of replacement of the lead service line on their property.

**Figure 1 – Configuration of a Service Line with Partial Ownership by the Utility and Homeowner**

**Utility service line** – the pipeline between the water main and the curb stop

**Homeowner service line** - the pipeline between the curb stop and the water meter. If the water meter is in an outdoor pit setting, the customer service line includes the pipeline extending to the building inlet.







## REGULATORY REQUIREMENTS – THE LEAD AND COPPER RULE

### Regulatory Background

The Safe Drinking Water Act (SDWA) is the legislation that addresses lead in drinking water. The Lead and Copper Rule is the specific regulatory mechanism designed to minimize lead in drinking water.

The Lead and Copper Rule (LCR), enacted into law in June 1991 and later amended in January 2000, applies to public water systems. Under the LCR, no more than 10 percent of tap samples from a targeted monitoring program conducted by a public water system may exceed the rule's Action Levels. The Action Levels specified in the LCR are 0.015 mg/l for lead and 1.3 mg/L for copper.

When the lead Action Level is exceeded, required follow-up steps include corrective action to implement optimized corrosion control and public notification. If a water system does not meet the lead action level, after installing corrosion control and/or source water treatment, then the system must replace at least 7 percent of the lead service lines in the distribution system annually. A system that does not replace the entire lead service line and that owns a segment of the service line must comply with notification, sampling and reporting requirements. A detailed summary of the Lead Service Line Replacement Requirements is provided in Appendix A.

### Summary of Results from the Lead Service Line Survey

During the fall of 2004, AWWA funded Black & Veatch to conduct a survey of 65 water utilities to document lead service line management strategies and replacement techniques. Forty-one utilities completed the survey. Of the forty-one respondents, eleven provided detailed information on:

- Lead service line inventory and rates of replacement,
- Lead service line replacement costs,
- Forms of communications with customers,
- Financial incentives that are offered to customers,
- Mandatory lead service line replacement programs,
- Practices to minimize disruption to customers,
- Obstacles to implementation of a complete lead service line program, and
- Recordkeeping practices.

A summary of the survey responses from the eleven utilities is provided in Appendix B.





## ELEMENTS OF A STRATEGY FOR CUSTOMER ACCEPTANCE OF COMPLETE LEAD SERVICE LINE REPLACEMENT

Gaining customer acceptance of lead service line replacement can be a challenging task. In addition to the disruptive nature of the replacement process, the cost and inconvenience that must be borne by the customer can be a very significant impediment. In spite of these obstacles, a number of utilities have implemented successful replacement programs. A feature common to each is an approach that incorporates elements of thorough preparation, financial incentives, effective public communications, follow-up interactions with homeowners and efficient recordkeeping practices.

Figure 2 presents a graphic summary of elements of a complete lead service line replacement strategy, based upon proven and documented utility experience. A menu of critical items and options is presented for each element of the strategy.

### Getting Prepared

Thorough preparation is an essential first step in a lead service line replacement effort, particularly if the effort is to include service lines under customer ownership. Steps to consider include: development of a lead service line replacement strategy; securing economic resources; coordination with other utility and public works departments; preparation of a communications strategy and communication with the State and Health Department. Each is described below with citations of relevant utility experience.

### *Development of a Lead Service Line Replacement Strategy*

In order to define the scope of a lead service line replacement effort, it is useful to develop a strategy that takes into account the following:

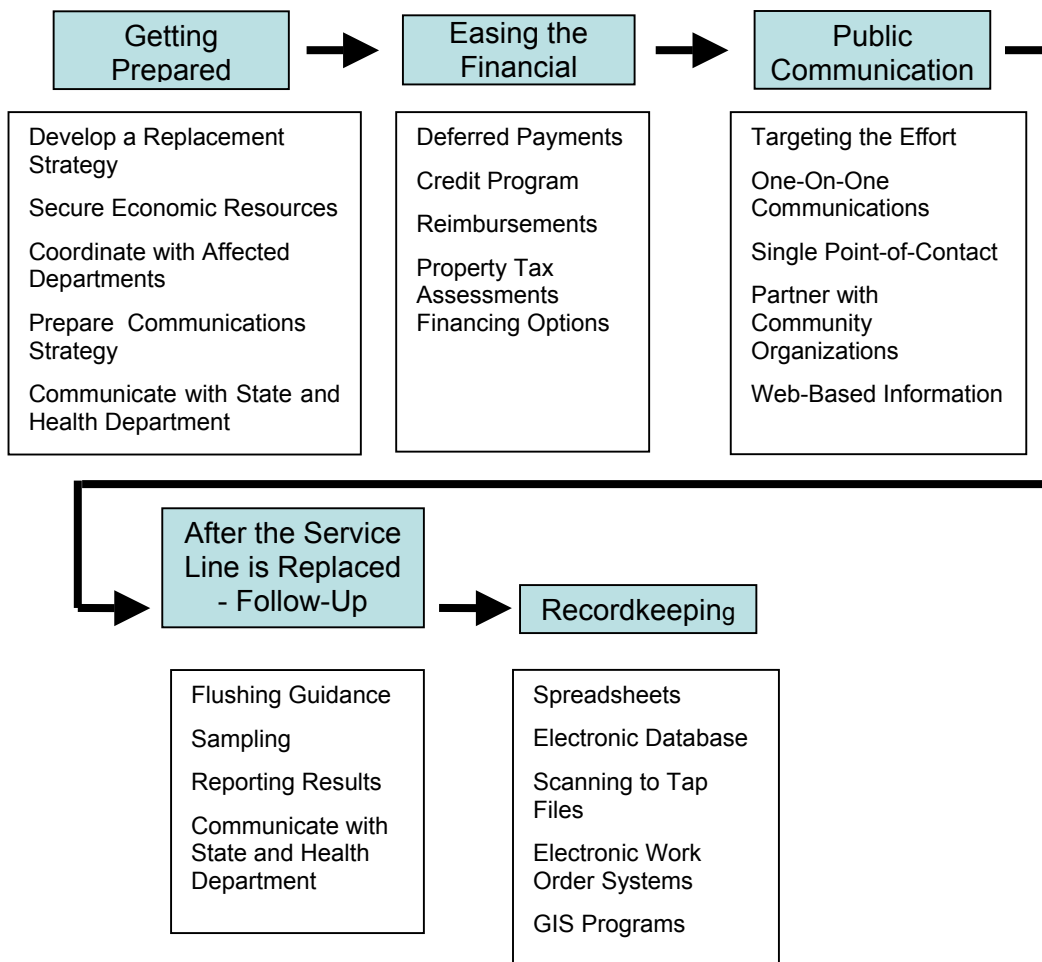
- Public streets,
- Factors that influence the strategy,
- Design of the replacement program,
- Targeted replacement efforts,
- Partnering with established lead reduction programs, and
- Weather conditions

Following is a brief explanation of each item.

*It is essential to coordinate lead service line replacement efforts with the departments responsible for public roadways.*

### *Public Streets*

It is essential to coordinate lead service line replacement efforts with the departments responsible for public roadways. In doing so, the water utility can develop a replacement schedule that accounts for ordinances governing street-opening procedures, paving schedules, road improvement projects and similar infrastructure improvement activities.



**Figure 2. Elements of a Strategy for Complete Lead Service Replacement**

Additional benefits include; avoidance of scheduling conflicts; implementation efforts that meet all local, state and federal ordinances/regulations; containment or reduction of costs that would otherwise be incurred if individual departments conducted the infrastructure improvements independent of one another; minimizing the frustration level of customers and the general public that utilize the roadways; and, the positive perception of a well coordinated, cost-effective infrastructure improvement program.

***Factors That Influence the Strategy***

A number of factors may have a bearing on the scope and implementation schedule of the lead service line replacement effort, such as:

1. Required Replacement - If removal of lead service lines is required for compliance with the LCR, the strategy must account for the requirement to replace at least 7 percent of the lead service line inventory in the distribution system, annually.
2. Quality of Utility Records-Depending upon the quality of the utility’s records, the composition and condition of service lines may or may not be well understood. If records on service line composition and condition are inadequate, the utility may need to implement procedures to identify service line composition. Because these procedures can be somewhat labor intensive, utilities must account for this in planning the scope and cost of the

replacement program. In cases where the composition and condition of customer-owned service lines is unknown, the utility may suggest to homeowners that they perform a plumbing profile utilizing the services of a certified plumber or that they conduct a self-directed inspection of their service line to determine its composition. Appendix A includes a sample plumbing profile and an example of one utility's customer self-directed inspection program.

3. Service Line Ownership-Utility ownership of service lines varies throughout the country and, in many respects, dictates the level of customer support necessary for complete lead service line replacement. In cases where the utility owns the entire lead service line, the need for customer acceptance is minimal. In instances where the customer owns the entire lead service line, the utility must obtain customer agreement as a requisite step prior to replacement of lead service lines. The most common ownership scenario is partial utility ownership, generally between the water main and the curb stop. The customer owns the service line between the curb stop and the residence and replacement requires their agreement.

### *Design of the Replacement Program*

In general terms, a utility can replace lead service lines either by incorporating the replacement activities into the broader service line renewal effort or by conducting a stand-alone replacement program. Data from the Lead Service Line Survey indicates that the majority of water utilities handle lead service line replacement as a component of the service line renewal effort associated with programmed replacements, routine maintenance, leak repairs, main replacements and street maintenance. A number of utilities described a dedicated lead service line replacement program that had been undertaken generally due to the sheer magnitude of the

inventory of lead service lines or the need to meet a regulatory compliance schedule. The survey data indicate that both approaches have proven to be successful.

Utilities that incorporate lead service line replacement into their service line renewal program emphasize the need for well thought-out and thorough internal coordination as critical to a successful effort.

### *Targeted Replacement Efforts*

A number of utilities participating in the Lead Service Line Survey identified high priority circumstances that warranted a targeted lead service line replacement effort. Examples include:

1. Sensitive Subpopulations - Buildings that house sensitive subpopulations (e.g. schools, child-care facilities) were designated a priority for lead service line replacement. Because these buildings are generally scattered throughout the distribution system, the utility must take into account the mobilization and manpower demands imposed by such a strategy.
2. Sites with Elevated Lead Levels - A number of water utilities have designed their replacement strategy to target the lead service lines of residences with elevated levels of lead in the tap water. As with Item 1 above, this places an added logistical burden on the crews tasked with implementing the replacement procedures.
3. Areas with Known Lead Challenges - Areas of the distribution system with a concentration of lead service lines (e.g. downtown centers in many older communities in the Northeast and Midwest) and segments of the distribution system subject to elevated corrosion rates (e.g. dead-ends, low-flow conditions) are examples of circumstances that may require targeted replacement efforts.

*Well thought-out and thorough internal coordination is critical to a successful lead service line replacement effort*

### ***Partnering with Established Lead Reduction Programs***

Many communities benefit from the efforts of organizations specifically established to deal with the issue of exposure to lead from sources other than drinking water. These organizations have recognized expertise in risk reduction and are generally perceived quite favorably in the eyes of the public. Partnering with these organizations can be very beneficial to water utilities and the communities that they serve. Such a partnership can lend considerable credibility to the utility's lead service line replacement efforts.

**Weather Conditions** Because lead service lines are most prevalent in the Northeast and Midwest, the replacement strategy must account for winter weather conditions that may either hinder replacement efforts or cause them to cease altogether, during extended periods of inclement conditions. In the City of Boston, for example, there is a moratorium on all street openings between November 15 and April 1, with the exception of emergencies. The replacement of lead service lines is not considered to be an emergency, unless the pipe is broken or leaking. Taking weather conditions into account is particularly important for utilities with mandated replacement quotas.

### ***Securing Economic Resources***

Implementing a comprehensive lead service line replacement program targeting complete lead service line replacement can represent a major undertaking for many utilities. The specific costs will be site specific, depending on how extensive lead service lines were used in a public water system's service area, how existing distribution system maintenance procedures will need to be modified, how engaged the water system is in ongoing outreach programs with the relevant service areas, and other factors. A challenge inherent in any major infrastructure improvement

program is ensuring that adequate financial resources are developed and devoted to the project. In the case of a lead service line replacement program, the need for funding could potentially exist for a period of up to 15 years in duration.

The great majority of water utilities depend largely on the rates they charge customers to fund their operations and capital improvements. Most publicly owned water utilities operate as an enterprise fund within their municipal structure and thus rely on their own revenues and, frequently, on their ability to issue revenue bonds to fund capital improvements. Consequently, a major project, such as a program to achieve complete lead service line replacement, will normally result in increased customer rates to cover the costs of the program. A board, commission or City Council that oversees utility operations normally must approve financial matters such as budget approvals, rate increases and bond issues. In addition, the rates for most privately owned utilities and for some publicly owned ones are regulated by a state public utilities commission. Annual budgets and rates for most publicly owned utilities must be approved by a city council. So, obtaining a long-term commitment of funds for a complete lead service line replacement strategy may be difficult and time consuming. It will require careful planning, information and education to convince decision makers and regulators that it is a priority that warrants funding and justifies rate increases.

Obviously, any funding a utility could obtain through grants or loans for a lead service line replacement program would offset the need for funding the program internally. However, it is unlikely that sufficient grant money could be obtained to offset the entire cost of the program. One potential source of funding for lead service line replacement work is the Drinking Water State Revolving Fund (DWSRF). The DWSRF has been established to assist community water systems in achieving or maintaining compliance with SDWA requirements and furthering the public health objectives of the SDWA. The DWSRF is administered by State primacy agencies. In order to obtain the low interest loans available through the DWSRF, utilities must

identify projects that rank sufficiently high within the primacy agency's priority system. As a general rule, projects designed to achieve compliance with SDWA requirements and protect public health, are ranked as highest priority. Therefore, if a utility must replace lead service lines to comply with the LCR, DWSRF funding may be available to the utility. Even if not required for LCR compliance, a compelling case can be made for reducing lead exposure from lead service lines as justification for DWSRF funding. It is recommended that utilities pursue DWSRF as a means to finance lead service line replacement programs. The DWSRF program, however, depends on annual federal budget allocations, and most states have far more demand for DWSRF assistance than funds available. So, even though an application may be well justified, there is no guarantee funds will be available from the DWSRF program. Providing that funds are available from the DWSRF program, a utility must still establish a rate schedule for repayment of the DWSRF loan.

As previously discussed, a lead service line replacement program preferably includes replacement of customer-owned lead service lines as well as utility-owned services. Replacement of customer-owned services may include financial investments or financial incentives provided by the utility. Funding of privately owned service line replacement may present an additional obstacle and difficulty for utilities. A public utility may be forbidden by state and local laws from conducting work on private property, as these general funds are typically restricted to a "public purpose". This in itself may prevent a utility from directly funding customer-owned lead service replacement unless a utility is able to define a public purpose for replacing privately owned lead service lines. In addition, only some portion of utility customers will have lead service lines and only some portion (maybe not the same customers) will have high lead levels. Yet, the utility may be asking all customers to help pay (through their rates) to resolve a problem that manifests itself directly at homes of relatively few customers. Funding of customer-owned lead service replacements is likely to trigger debate about the efficacy and equity of such action and the public benefit that will accrue from it.

One utility faced with this difficulty obtained city council approval, after much debate, for a financial program that reimburses customers who replace their lead service lines for one-half the cost of replacement up to a maximum of \$1,000. The utility argued that replacement of customer lead service lines was needed in order for the utility and the city to gain compliance with federal regulations. The reimbursement program was established in lieu of direct replacement of service lines to avoid the prohibitions and liabilities of conducting work on private property. In this particular case, replacement of lead service lines would allow the utility to avoid significant drinking water and wastewater treatment costs that would otherwise have caused increases to the water and sewer rates of all utility customers. The utility justified investment in replacement of customer-owned services by documenting direct costs that could accrue to all utility customers and less quantifiable ancillary costs that could accrue to the community as a whole if lead service lines were not replaced. A compromise of providing customer reimbursement for one-half the cost of replacement was made in recognition that replacement of the service lines provides a benefit to the utility and city as well as providing a benefit to the individual customer whose service line is replaced.

Securing economic resources for a comprehensive and, possibly, long-term lead service line replacement program is going to be a challenge for utilities. Utilities and cities can continue to work for federal grants for this purpose or for infrastructure improvements in general and can continue to lobby for funding for the DWSRF. Lead service replacement in areas of low and moderate income families may be funded through community development funds or by a city or town agency other than the water department. If direct city action on private property is prohibited, rebates or bill reductions for lead service replacement may be allowable. A "betterment charge" may be way to effectively loan the money to homeowners reducing their upfront cost. If general obligation or revenue bonds cannot be used on private property, some jurisdictions may be able to borrow from commercial sources, and recoup the payments from homeowners as a special charge.

Good information, communication and planning are essential to obtaining approvals for funding lead service replacement programs.

*In the City of Boston, a street is designated as “guaranteed” once it is paved, prohibiting excavation for a period of five years. Coordination between the Boston Water & Sewer Commission and the City’s Street’s department is essential to ensure that service line replacement occurs prior to planned paving efforts.*

### **Coordination with Other Public Works Departments and Jurisdictions**

Lead service line replacement generally involves excavation in public roadways, making it essential to coordinate the replacement effort with the departments responsible for public roadways as well as other utilities that may have underground structures, pipelines, cables, etc buried in proximity to the utility’s water mains and service lines. Because many water utilities serve multiple communities, it is important to extend coordination efforts to the public works departments in all affected jurisdictions.

Significant constraints can be imposed upon the replacement effort by ordinances that govern street-opening procedures. For example, in the City of Boston, when a street is paved, it is designated as “guaranteed”. Except in an emergency, excavation is prohibited for a period of five years. Coordination between the Boston Water & Sewer Commission and the City’s street’s department is essential to ensure that service line replacement occurs prior to planned paving efforts. Several utilities responding to the lead service line survey reported a similar requirement for coordination between public works departments.

### **Prepare a Communications Strategy**

Upon finalizing the logistics of the replacement program, development of a communications strategy follows from the replacement strategy. The goal of the communication plan is to obtain cooperation and acceptance from customers / property owners for complete lead service line

replacement. Specific communication tools are identified in a subsequent section of this report.

### **Communication with the State and Health Department**

Keeping an open line of communication with the state and the local health department prior to and throughout the replacement program is advisable. In some cases, this communication is required by the LCR (in situations where the action level was exceeded and lead service line replacement is mandated). A significant benefit of involving regulatory and health officials early-on in the process is that they are perceived as experts in the eyes of the public from a regulatory and health standpoint. Given the volatile nature of the concerns with lead in tap water, support for the utility’s lead service line replacement program by regulatory and health authorities adds credibility to the process.

*The most significant barrier to acceptance of lead service line replacement is the expense that must be borne by the homeowner.*

### **Easing the Financial Burden**

The most significant barrier to acceptance of lead service line replacement is the expense that must be borne by the homeowner.

In an effort to ease the financial burden, a number of utilities have developed financial incentive packages that are offered to their customers. In some cases, the customer can take advantage of either a single incentive offering or a combination of incentives. One utility has developed an offering for homeowners in low-income situations.

Specific examples of incentive offerings include:

- Low-income deferred payment program – For customers who meet specific “low-income” criteria, the utility pays a certified plumber, on behalf of the customer, for replacement costs. The debt to the utility is placed as a lien against the customer’s property and accrues interest at a pre-determined rate.



The customer has the choice of making payments on the debt in any amounts he/she deems affordable or of deferring any or all payment on the debt until the property transfers ownership. The utility has found this “low-income” program particularly attractive for elderly customers on a fixed income who anticipate selling their home and moving to senior housing or assisted-living in the foreseeable future.

- Providing credit to a certified plumber – A specified amount of credit is offered to a certified plumber of the customer’s choosing, to offset the cost of replacing the service line. Typical values for the credit amount range from \$1,000 to \$1,500. The customer is responsible for any costs over and above the established credit amount. In the case of one large utility, the balance due can be charged to the owner’s account for repayment over a 24-month period with no interest charges accrued over the repayment period.
- Customer reimbursements – Following replacement of the service line by a certified plumber, the utility reimburses the customer for one-half of the replacement cost. A “not to exceed” value can be established or the utility may waive such a value altogether. A typical “not to exceed” reimbursement value is \$1,000.
- Property tax assessment - The property taxes of the homeowner are reduced by an amount equivalent to the replacement cost, via a one-time tax assessment.
- Financing the cost of replacement – The customer can finance the cost of the service line replacement via a low-interest rate loan offered by the utility. A 4% interest rate is one example identified in the lead service line survey.

*Make it easy for the homeowner to take advantage of the financial incentives that have been offered. Provide the homeowner with simple, specific information about the terms of the incentive program*

By offering financial incentives, a utility can often overcome the most difficult barrier to customer acceptance of replacement of their lead service line. Utilities that have implemented successful incentive programs offer the following sound advice: Make it easy for the homeowner to take advantage of the financial incentives that have been offered. Provide the homeowner with simple, specific information about the terms of the incentive program including: the amount of money involved in the transaction, repayment terms, interest rates, impact on their credit standing and property lien details, if applicable.

Governing board acceptance is a key step in implementing incentive programs. Involving governing boards in development of any incentive program can facilitate approval. In the case of private utilities, authorization by regulatory authorities is necessary prior to offering the incentives to property owners.

Mandatory Lead Service Line Replacement Programs - As previously mentioned, water utilities generally do not have control over service lines on private property or downstream of the curb stop or shut-off valve. In addition, there are usually legal prohibitions, restrictions and/or liabilities associated with a utility working on private property or issuing a public works contract for such work. Consequently, most utilities that implement programs for replacement of customer-owned lead service lines are limited to providing education, encouragement and incentives to customers. Ultimately, the decision on whether or not to replace a lead service line on private property rests with the customer.

In two instances, however, a utility or city has mandated the replacement of lead service lines on private property. In one case, the utility was in the rather unique position of owning the service line extending from the water main in the street to

the water meter in the customer's home. As owner of the service line on private property, the utility had the authority to replace the entire service line. Access into the customer's home for the express purpose of service line replacement was a condition of service. If the owner were to deny access, the utility could disconnect water service to the property. Since the utility owned the entire service line, there was no financial obligation to the customer for the cost of service line replacement.

Another utility exceeded the lead Action Level and was unable to establish optimized corrosion control with best available treatment techniques, owing to a number of unique circumstances. In order to comply with the LCR, the utility proposed to replace its lead service lines in lieu of chemical treatment. The primacy agency regulating the utility determined it could only accept lead service replacement as a substitute for corrosion control treatment if the utility ensured replacement of both the utility-owned and customer-owned portions of lead service lines. Since the utility could not legally work on private property or issue contracts for work on private property, the utility sought and obtained a City ordinance that required customers to replace their lead service lines. In conjunction with this mandated replacement program, the utility administers a reimbursement program that pays customers for half the cost of replacement up to \$1,000. The utility also has an additional financial program for low-income customers.

While both approaches have proven to be successful for the respective utilities, the circumstances facing each were unique. Due to private ownership, property rights and other legal issues, mandated programs for replacement of customer lead service lines are particularly difficult to implement and will not likely be pursued except in the most extreme cases when other alternatives are not available. These cases, however, illustrate the extent of actions utilities have taken given their specific circumstances.

## Public Communications

“Do not embark on a lead service line replacement project without thoroughly and broadly educating

the public on the issue. Merely informing them through written media and the Consumer Confidence Report is not sufficient.” This is the advice offered by a large utility that has implemented a successful service line replacement program.

Utilities have employed a wide variety of tools to inform homeowners about lead service line replacement, ranging in scope from one-on-one communications to general outreach to the entire community. These tools have varying levels of effectiveness in getting their intended message across to the target audience. Effective communication efforts on lead service line replacement have been both informative and persuasive in order to gain homeowner acceptance for replacement of the service line on their property. With that in mind, the matrix presented in Table 1 summarizes the various forms of communications commonly used by utilities and provides an assessment of the likely effectiveness of each, in the context of achieving customer acceptance of replacement of lead service lines.

*One-on-one communication between the utility and homeowner has proven to be very successful in gaining acceptance of replacement of lead service lines*

As noted above, a targeted communications effort is more likely to result in homeowner acceptance of lead service line replacement on their property than a general outreach approach. In particular, one-on-one communication between the utility and homeowner, or the homeowner's plumber, has proven to be very successful. One large utility participating in the lead service line survey cited a 90 percent success rate resulting from one-on-one contact with homeowners.

By clearly communicating the purpose for action and immediately offering concrete actions that homeowners can take, outreach efforts can effectively reach affected homeowners. Programs which create a sense of anxiety about the quality of the water, without offering the consumer a way to resolve the problem, are counterproductive. Programs that create a sense of need and identify

**Table 1. Anticipated Effectiveness of Selected Communications Options**

<b>Medium</b>	<b>Option</b>	<b>Anticipated Effectiveness</b>
One-on-One Contact	Utility staff (e.g. inspector, field service representative) meets with property owner on individual basis	High
	Utility representative works directly with plumber hired by property owner	Low-Moderate
Partner with Community-Based Organization(s)	Utilize communications and outreach expertise of the Organization(s)	High
Web-Based Information	Utility website with information about lead service line replacement	Moderate-High
	Internet information about lead	Moderate
Telephone Contact	Utility contacts property owner by telephone to discuss service line replacement	Moderate
Public Meetings	Public meetings/hearings to provide forum for information exchange	Moderate
Written Correspondence	Door Hangers/Postcard affixed to door	Moderate
	Bill inserts with information about lead service line replacement	Low
	Consumer Confidence Report – section devoted to lead	Low
	Direct Letter to homeowner	Low
Mass-Media	Television-news items, public service announcements about service line replacement	Low
	Newspaper-articles and notices about service line replacement	Low

corrective actions, but do not offer the immediate opportunity for action, are also unlikely to be effective. Consumers have many demands on their time and attention and may quickly move beyond the issue of lead service line replacement. This is one reason why efforts, such as direct outreach, where a staff person speaks to the customer in their home have the highest success rate.

### *Designing a Communications Plan*

Effective communications plans have tangible goals, like:

- Specific plans and objectives for efforts to reach specific audiences such as those neighborhoods with a high density of lead service lines or homes with known lead service lines and elevated levels of lead in the tap water

- Identify specific elements of one-on-one communication with homeowners
- Include mechanism for ongoing communication, such as designating a certified plumber of the utility's (or customer's choosing) to act as the point of contact.

*Community-based organizations dedicated to the goal of reducing exposure to lead can be an influential partner in the utility's efforts to replace lead service lines*

Managing community lead exposure has a long history in many communities. Consequently there are existing community organizations that can aid in outreach efforts on lead. When implementing the communications plan, the utility can consider availing itself of the expertise and established presence of these organizations. Such partnerships have proven successful when dealing with homeowners and the general public.

The popularity of the Internet affords an opportunity to provide details about lead service line replacement in the utility website. For example, the Madison (Wisconsin) Water Utility website provides information about lead exposure, lead service line replacement, helpful procedures for customers and contact listings. The Madison site is an example of effective web-based communications. It can be accessed at: <http://www.madisonwater.org/leadindex.html>

*Following service line replacement, customers will need easily-understood flushing directions. This guidance is an instance to emphasize the importance of flushing after any significant period of stagnation.*

In summary, a targeted communications plan characterized by repetition and conducted with the assistance of community-based organizations can be quite effective in gaining acceptance of lead

service line replacement on the homeowner's property.

*AwwaRF will be releasing Strategic Communication Planning: A Guide For Water Utilities by early 2006. This report will provide practical advice on managing and budgeting public communication efforts such as the one needed to support a complete lead service line replacement effort.*

### **After the Service Line Has Been Replaced – Follow-up Actions**

There are a number of follow-up actions to keep in mind upon completing replacement of the service line. These include:

1. Communication with the homeowner about flushing procedures and managing post-replacement lead levels - Lead levels have a tendency to become elevated for a temporary period of time following service line replacement. Easily-understood flushing directions can help homeowner's minimize any exposure during this period. Emphasis should be placed upon the importance of following the instructions after any significant period of stagnation.

Utilities may wish to consider providing bottled water, bottled water vouchers, instructions on the types of water filters that a homeowner may want to purchase, or provide a filtering device (e.g. a pitcher filter or household filter) to the property owner during this interim period.

2. Follow-up samples - If lead service line replacement is required for compliance with the LCR, the water system must collect a representative sample from each replaced lead service line within 72 hours of

completion of the replacement. In cases where lead service line replacement is not mandatory, the utility may choose to conduct follow-up sampling to determine if lead levels in the tap water are below the lead action level. A utility can also advise homeowners about how to take samples of lead and explain local options for obtaining sample analyses.

It is important to note that the sampling procedures for determining the lead contribution from a service line are different from the procedure for first draw samples. Service line sampling procedures are outlined in Appendix A (pages 20 and 21). Further, caution should be exercised in interpreting the data from service line samples. A single sample result may not be representative of the true contribution to lead levels resulting from service line replacement. As such, it may be prudent to collect a series of samples over a defined period of time in order to accurately gauge the trend in the behavior of the lead levels after a lead service line replacement.

3. Providing results to the homeowner - Results from samples collected as a requirement for LCR compliance must be reported to the owner and resident(s) within 3 business days of receiving the results from the laboratory. Likewise, in cases where the utility has conducted non-compliance sampling, customers expect information on observed levels in a timely manner, particularly if the results suggest elevated lead levels.
4. Communications with the State and Health Department - Water systems that are required to replace lead service lines for LCR compliance must provide a copy of post-lead service line replacement results to the State within the first 10 days of the month

following the month in which the results are received from the laboratory. Individual state primacy agencies have different expectations for handling non-mandatory sample results. Likewise, some local health departments find this type of information informative. Discussing agency needs and expectations for this data can facilitate communication with these agencies.

5. Additional Sources of Information - There is a wealth of information available about lead in drinking water that can be offered to customers who wish to obtain more specific information. A listing of recommended resources is provided in Appendix E.

## **Recordkeeping**

Accurate and timely recordkeeping is an essential element of a lead service replacement effort. In addition to satisfying compliance requirements of the LCR, if necessary, comprehensive records enhance the utility's capability to respond to concerns of the public, the media and regulators. The records also provide an accurate accounting of service line composition in the event that it is necessary to access that information in the future.

In some instances, obtaining the data necessary for complete and accurate records will require coordination with other departments within the utility and/or other public works departments. It is important to clearly describe the recordkeeping design and data capture responsibilities of each department prior to initiation of the service line replacement effort. A periodic review of data capture procedures and the quality of data is important to assuring that data collection practices are indeed working smoothly and a sound data set is generated and maintained.

A summary of the range of recordkeeping practices employed by utilities is presented in Appendix B on page 18.





## SUMMARY

Complete lead service line replacement may represent a significant challenge for water utilities because of complicated ownership issue. In cases where part of the service line is owned by the utility and part by the property owner, a utility that seeks to replace the entire lead service line must obtain permission from the homeowner/property owner to do so.

A number of utilities have implemented successful complete lead service line replacement programs. This document draws upon the experiences of those utilities and presents the elements of a strategy to obtain property owner acceptance for complete lead service line replacement.





## Appendix A. Requirements of the Lead and Copper Rule Pertaining To Lead Service Lines

If a water system does not meet the lead action level, after installing corrosion control and/or source water treatment, then the system must replace at least 7 percent of the lead service lines in the distribution system annually. A system is not required to replace an individual lead service line if the lead concentration, in all samples from that service line, is less than or equal to 0.015 mg/L.

A water system is required to replace only the segment of the lead service line which it owns. In situations where the water system does not own the entire lead service line, the system must notify the property owner (or the owner's authorized agent) that the water system intends to replace the lead service line and must offer to replace the property owner's portion of the service line. Water systems are not required to bear the cost of replacing the property owner's service line nor are they required to replace that segment if the owner chooses not to pay the cost of replacement.

A water system that does not replace the entire lead service line and owns a segment of the service line must comply with the following:

a. Notification to Residents

At least 45 days prior to partial replacement of the lead service line, the water system must notify the residents of all buildings served by the lead service line that they may experience a temporary increase in the lead levels in their drinking water. Guidance on measures that can be taken to minimize exposure to lead must also be provided at that time. The notification requirements can be satisfied by a direct mailing or other means approved by the State. In instances where multi-family dwellings are served by the lead service line, the water system has the option of posting the information in a conspicuous location.

b. Sampling and Reporting Requirements

The water system must inform residents served by the lead service line that the system will collect a representative sample from each partially-replaced lead service line within 72 hours of completion of the replacement. The system must report the results of the analysis to the owner and resident(s) served by the lead service line within 3 business days of receiving the results from the laboratory. The cost of the sampling and analysis must be borne by the water system.

Each service line sample shall be one liter in volume and have stood motionless in the lead service line for at least six hours. Lead service line samples shall be collected in one of the following three ways:

1. At the tap after flushing the volume of water between the tap and the lead service line. The volume of water shall be calculated based on the interior diameter and length of the pipe between the tap and the lead service line.
2. Tapping directly into the lead service line, or
3. If the sampling site is a building constructed as a single-family residence, allowing the water to run until there is a significant change in temperature which would be indicative of water that has been standing in the service line.

c. Reporting Post-Lead Service Line Replacement Results to the State

Water systems must provide a copy of post-lead service line replacement results to the State within the first 10 days of the month following the month in which the results are received from the laboratory. States have the authority to modify or eliminate this reporting requirement.

States have the authority to require a water system to replace lead service lines on an expedited schedule. The State must make this determination in writing and notify the water system of its findings within 6 months after the system is triggered into mandatory lead service line replacement.

Water systems may cease replacing lead service lines, with State acceptance, when water samples collected to measure the lead contribution from lead service lines, meet the lead action level during each of two consecutive monitoring periods. Subsequent water samples that exceed the action level require the water system to recommence replacing lead service lines.

Additional information about the LCR is available on the EPA Office of Ground Water and Drinking Water's website at: <http://www.epa.gov/safewater/lead/index.html>

## Appendix B. Summary of Results from the Lead Service Line Survey

### Lead Service Line Inventory and Rates of Replacement

Presented in Table 1 is a summary of the inventory estimates of utility-owned lead service lines in 1992 and 2003 with the corresponding percent reduction attributable to service line replacement. Also provided is a qualifying statement as to the confidence level associated with the accuracy of the estimates. Table 2 presents similar information for customer-owned lead service lines. The utility numbers are consistent for both Tables 1 and 2.

**Table 1. Estimated Inventory of Utility-Owned Lead Service Lines**

Utility No.	1992 Lead Service Line Inventory	2003 Lead Service Line Inventory	Percent Reduction, %	Confidence in Inventory Estimate
1	36,000	20,000	44	High
2	9,000	3,300	63	Medium - High
3	283,000	280,000	1	Low
4	unknown	0	n/a	Low
5	10	0	100	High
6	0	0	0	High
7	1,000	200	80	Medium
8	unknown	0	n/a	Low
9	unknown	62	n/a	Low
10	7,000	3,100	56	High
11	12,744	11,351	11	Medium

**Table 2. Estimated Inventory of Customer-Owned Lead Service Lines**

Utility No.	1992 Lead Service Line Inventory	2003 Lead Service Line Inventory	Percent Reduction, %	Confidence in Inventory Estimate
1	36,000	20,000	44	High
2	15,000	5,800	61	Medium - High
3	unknown	unknown	n/a	Low
4	unknown	unknown	n/a	Low
5	1,250	800	36	High
6	unknown	unknown	n/a	Low
7	400	300	25	High
8	unknown	unknown	n/a	Low
9	unknown	unknown	n/a	Low
10	7,750	2,600	66	High
11	5,455	5,227	4	Medium

More recent data, representing the replacement of lead service lines in 2002 and 2003, is presented in Tables 3 and 4, respectively. The utility numbers are consistent for both Tables 3 and 4.

**Table 3. Utility and Customer-Owned Lead Service Lines Replaced in 2002**

Utility No.	No. of Utility-Owned Lead Service Lines Replaced	No. of Customer-Owned Lead Service Lines Replaced
1	2,000	2,000
2	680	820
3	250	Unknown
4	746	Unknown
5	0	15
6	0	18
7	400	10
8	0	6
9	Unknown	Unknown
10	539	642
11	150	190

**Table 4. Utility and Customer-Owned Lead Service Lines Replaced in 2003**

Utility No.	No. of Utility-Owned Lead Service Lines Replaced	No. of Customer-Owned Lead Service Lines Replaced
1	2,000	2,000
2	272	375
3	250	0
4	700	0
5	0	10
6	0	20
7	400	10
8	0	6
9	402	75
10	746	700
11	162	193

Of the 11 utilities, 6 had components of a specifically-designed lead service line replacement program. The others replace lead service lines as-needed or coincident with another construction project such as main replacement or street paving.

## Lead Service Line Replacement Costs

Presented in Table 5 is a summary of the costs incurred to replace utility and customer-owned lead service lines. The utilities were asked to include the costs associated with mobilization, replacement and restoration.

The utility numbers are consistent with those presented in Tables 1-4. A descriptor is provided to characterize the nature of the replacement effort, whether it be a specifically designed replacement program or as-needed/coincident with construction projects

**Table 5. Summary of Lead Service Line Replacement Costs**

Utility No.	Utility-Owned Lead Service Line Replacement Costs	Customer-Owned Lead Service Line Replacement Costs	Nature of Replacement Program
1	\$1,150	\$1,150	as-needed / incidental / designed
2	\$1,500	\$2,000	designed
3	\$1,000 - \$1,500	\$1,000 - \$10,000	as-needed / incidental
4	\$2,500	not provided	incidental
5	not provided	\$450 - \$2,500	as-needed / designed
6	not provided	\$1,200	designed
7	\$800	not provided	as-needed / incidental
8	not provided	\$4,000	incidental
9	\$3,200	not provided	incidental
10	\$2,000	\$1,400	designed
11	\$1,650	\$1,450	designed

### *Public Communications*

Examples of the various forms of communication employed by utilities to inform customers about lead service line replacement include:

- Direct mailings and letters explaining lead service line replacement
- Direct mailings and letters seeking customer acceptance for replacement of the service line on the customer's property. Typically, this correspondence is sent to the customer several months in advance of replacement activities and again just prior to the date of replacement. Sample letters are provided in Appendix D.
- Distribution of brochures containing facts about lead and health and steps to minimize exposure to lead
- Distribution of brochures that explain lead service line replacement techniques and customer flushing procedures following completion of the service line replacement
- Bill inserts with facts about lead and health effects

- One-on-one visits to individual customers by utility personnel. This is reported to have a 90 percent success rate in obtaining customer acceptance for service line replacement.
- Media coverage (television and newspaper) of the lead service line replacement program and the risks posed by exposure to lead.
- The annual Consumer Confidence Report
- Public meetings/hearings
- The utility website with specific information about lead and the lead service line replacement program

### *Financial Incentives*

Examples of financial incentives offered to customers to offset the economic burden of lead service line replacement include:

- Reduction of the homeowner's property taxes in an amount equivalent to the service line replacement cost, via a one-year assessment.
- Financing of the replacement cost at a special interest rate.
- A \$1,000-\$1,500 credit toward the cost of replacement of the service line. The owner is responsible for any costs over and above the credited amount. The balance owed can be charged to the owner's account for repayment over a 24 month period with no interest accrued.
- Reimbursement to the homeowner for one-half the cost of the replacement. Some utilities have established a \$1,000 reimbursement limit while others have not set a limit.
- Utility payment of the plumber that performs the service line replacement. The customer is obligated to repay the utility over an agreed-upon period of time. A lien is established against the owner's property under this option.

### *Mandatory Lead Service Line Replacement*

Two utilities reported on mandated replacement of lead service lines on private property:

- One utility owns the entire lead service line. Access into the customer's home for the express purpose of service line replacement is a condition of service. Should the owner not grant access, water service can be discontinued to that property.
- One utility sought and obtained a City ordinance that required customers to replace their lead service lines. In conjunction with this mandated replacement program, the utility administers a reimbursement program that pays customers for half the cost of replacement up to \$1,000. The utility also has an additional financial program for low-income customers.

### *Practices to Minimize Disruption to Customers*

Practices and procedures to minimize disruption resulting from service line replacement include:

- Use of trenchless technology to minimize property damage and duration of interruption of service
- Providing bottled water upon request from the customer

- Performing replacement at a convenient time for the customer
- Communicating directly with the customer's plumber to avoid confusion and logistical issues
- Providing post-replacement flushing and maintenance guidance

### *Obstacles to Implementation of Complete Lead Service Line Replacement*

Cited obstacles to complete lead service line replacement include:

- Difficulty in establishing service line replacement as a priority expenditure within the utility's capital investment program
- Competition for economic resources within the water utility
- Maintaining continuity among utility departments to keep accurate records and employ consistent replacement procedures
- Difficulty in coordinating replacement efforts with the City's paving plans
- Difficulty in coordinating the replacement effort among affected branches of public works departments and utilities
- Lack of accurate records on the composition of service line materials
- Repetitious work performed in a specific area (e.g. repaving a street each time that utility work occurs)
- Prohibitive repaving costs
- Targeted replacement of lead service lines at buildings with sensitive subpopulations requires crews to move sporadically throughout the distribution system, introducing labor deployment inefficiency.
- Lack of clarity of the Lead and Copper Rule
- Difficulty in explaining the concept of action levels as compared to MCLs
- Lack of a definitive link between lead levels in drinking water and health effects
- Negative public perception of the intrusion associated with service line replacement

### *Recordkeeping Practices*

Recordkeeping procedures associated with service line replacement include:

- Designing and maintaining a spreadsheet of service line inventory and composition
- Maintaining an electronic database of service line inventory
- Recording new service line locations and scanning locations into a tap card file
- Updating of electronic work order systems by utility crews and contracted plumbers as service line replacements are completed
- Incorporation of service line locations/replacements into a GIS program
- Tracking of costs (i.e., a work order system for in-house work and invoices for contract work)
- Integration of an electronic database of service line information with an AM/FM/GIS system





## Appendix C. Sample Plumbing Profile

The following questions and corresponding explanations may assist in identifying the composition and condition of a customer's service line or other home plumbing. It may be advisable to consult a local plumbing expert in order to accurately answer the questions.

**Question: When was the facility constructed?**

**Significance:** While the dates may vary from one community to another, generally buildings constructed through the early 1900s commonly used lead interior pipes. Plumbing before 1930 is most likely to contain lead. Between 1920 and 1950, galvanized pipes were used for interior plumbing. After 1930, copper generally replaced lead as a service line material. Up until the late 1980s, lead solders were typically used to join copper pipes. The lead-free requirements of the 1986 Safe Drinking Water Act banned lead solder with more than 0.2% lead and plumbing with more than 8% lead. Buildings did not have to be built with certified "lead-free" fixtures until 1997

**Question: What material is used in the service line?**

**Significance:** Historically lead piping was used in some communities for service lines that join buildings to public water supplies. Lead pipes are dull gray in color and may be easily scratched by a metal object. Lead pipes can be a source of lead contamination. Galvanized pipes are gray and usually fitted together with threaded joints. Copper pipes are red-brown in color. Corroded portions may show green deposits. A refrigerator magnet will stick to galvanized pipe but not to lead or copper pipe.

**Question: Do faucet screens collect metallic particles?**

**Significance:** Lead-containing sediments trapped on screens are an indication that there is corroded lead pipe in the plumbing system that can be a source of contamination. Testing can determine whether the sediment contains lead. Cleaning screens frequently reduces exposure if there is lead in sediment trapped there..

**Question: Are there other signs of corrosion?**

**Significance:** Corrosion may indicate high levels of lead, copper and iron in the water.

**Question: Is electrical equipment grounded to water pipes?**

**Significance:** Electric current traveling through the ground wires may accelerate the corrosion of interior plumbing containing lead. DO NOT remove the wires from the pipes unless a qualified electrician installs an alternative grounding system. Improper grounding of electrical equipment may cause severe shock.

**Question: Has a tap water sample tested positive for lead?**

**Significance:** Results of testing for lead can provide clues about the materials of construction in the residence and the resulting impact on lead levels in the water. If the answers to other questions in this profile indicate a potential for a lead service line or home plumbing, it is strongly advised to test the water for lead levels. The validity of lead testing in water depends on following a strict protocol of sampling techniques. Contact your water utility or testing lab to ensure that proper sampling protocol is followed.

## **Customer Self-Directed Lead Service Line Inspection Program**

Madison Water Utility in Wisconsin implemented a ten-year program of complete (customer and utility) lead service line replacement in 2001. While the Utility had good records of the location of utility-owned lead service lines, its records of the location of lead on the customer side of the service were sporadic at best. Knowing that the Utility and area plumbers stopped using lead as a service line material about 1928, the Utility sent an inspection survey form to the owners of all properties developed before that time period. The Utility required owners of such properties to self-inspect (or to have their plumber inspect) the service line where it entered the home and report back on the form provided, within 90 days of receipt, whether the service line was lead, copper, galvanized steel or another material. The Utility provided a brochure to the owner with step-by-step instructions on how to identify the service line material. (A copy of the identification procedure can be viewed at [www.madisonwater.org/leadstep.html](http://www.madisonwater.org/leadstep.html).) The results of this survey became the Utility's initial record of location of customer-owned lead service lines.

In order to ensure the accuracy of the information submitted through the customer self-inspection survey, the Utility took several steps. First, it created a profile of likely locations of customer lead service lines, including age of home and utility service material type, and compared the results of the survey with the profile. If the survey data did not meet the profile, the Utility scheduled an inspection to verify the service type. Second, the Utility trained its meter inspectors to identify service line materials and instructed them to report the service line material type each time they conducted their routine meter change-outs. This information is compared to survey results and changes to the record are made where needed. Since the meter change-out cycle at the Utility is about 10 years, a final verification of all survey results will take that long to complete, but the Utility is assured of eventually having a reliable record of where all customer-owned lead service lines are located.

The Utility started its complete lead service line replacement program on the basis of the survey results and any additional information it receives on an ongoing basis through profile-comparison verifications and meter inspector reports. By the end of the ten-year replacement program, all properties will have undergone a meter change-out and associated utility verification of service type. Consequently, by the end of the replacement program, the Utility will be reasonably assured that all customer lead service lines have been identified and replaced.

## Appendix D. Sample Letters to Customers

### EXAMPLE A – Initial Notification

Date

Homeowner Address

**Subject:** Replacement of Lead Service Line

Dear [Homeowner],

Our records show that you are served through a lead water service line. The (name of utility) recommends that you retain a licensed plumber to replace your lead service line at a time that coincides with replacement of the utility-owned segment of the service by (name of utility). (Name of Utility) tentatively projects scheduled replacements on your block to begin in 6 to 12 months.

You will receive another notice as the start of the lead replacement project nears, notifying you more specifically of the projected schedule. The purpose of this letter is to inform you of the upcoming project and of the recommendation that you replace your lead water service at that time, enabling you to better plan for the cost of replacement.

(Name of Water Utility) will replace the portion of any lead water service line in the street right-of-way at no cost to you. Property owners are responsible for paying to replace the portion of any lead water service line on their property between the street and the water meter. The average cost for replacement of the property owner's portion of a lead water service line has been approximately \$(insert amount). The actual cost may vary, however, depending on site-specific conditions. Property owners are urged to obtain bids from two or more plumbers in order to obtain the best possible price. Some plumbers may be willing to provide a discount if they are able to mobilize for a number of replacement projects in the same neighborhood at the same time.

We hope that this information will help you plan for the upcoming lead service replacement project. If you have any questions please feel free to contact us at the numbers or email addresses provided above.

Sincerely,

[Signature Authority for Utility]

## **EXAMPLE B – Notification When Utility Work is About to Begin**

Date

Homeowner Address

Subject: Replacement of Lead Service Line

Dear [Homeowner],

(Name of utility) will be replacing the portion of your lead water service in the street right-of-way in the next 30 to 90 days. This letter is provided to notify you of the recommendation that you replace the portion of the lead service line located on your property at the same time the Water Utility replaces the service line in the street right-of-way.

We suggest that you obtain bids for the work from several licensed plumbers and then choose the plumber that gives you the best bid. The plumber will schedule and coordinate the work with the Water Utility.

The Water Utility work in the street right-of-way will take approximately one day to complete. A temporary patch in the road will be placed soon after the excavation. The final restoration work in the terrace and the reconstruction of the street will be completed at a later date as scheduling permits. Tree trimming, pruning or removal may be required.

After the lead pipes have been replaced, we recommend that you continue to run cold water to flush the plumbing system for several minutes each time you draw water for drinking or cooking. This may be necessary for at least three years after the lead pipes are replaced, because lead particles can remain in the system after pipe replacement.

An outline of procedures that property owners and residents can expect is enclosed. Contact telephone numbers are also included if you have any further questions or concerns.

Sincerely,

[Signature Authority for Utility]

Attachment (1): [Utility] Lead Service Line Replacement Procedures

## Appendix E. Sources of Information

There is a significant body of information on the topic of dealing with lead in the drinking water supply of schools and day-care facilities. Following is a partial listing of useful reference materials and the website address at which the materials can be accessed

### **American Water Works Association**

<http://www.awwa.org>

### **American Water Works Association Research Foundation**

<http://www.awwarf.org/research/TopicsAndProjects/Resources/SpecialReports/Corrosion/index.aspx>

### **Centers for Disease Control:**

CDC Childhood Lead Poisoning Prevention Program

<http://www.cdc.gov/nceh/lead/about/program.htm>

### **CDC Childhood Lead Poisoning Surveillance**

<http://www.cdc.gov/nceh/lead/surv/surv.htm>

### **National Rural Water Association**

<http://www.nrwa.org/>

### **U.S. Environmental Protection Agency**

<http://www.epa.gov/safewater/lead/index.html>

**Implementation of the Lead and Copper Rule -** <http://www.epa.gov/safewater/lcrmr/implement.html>

### **Plumbing Standards**

<http://www.nsf.org>

### **Hotlines:**

National Lead Information Center: 800-424-LEAD

EPA Safe Drinking Water Hotline: 800-426-4791