

DENVER WATER LEAD REDUCTION PROGRAM

LEARNING BY DOING – 2021

Version 1.0: February 25, 2022

Presented by: Denver Water



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LIST OF ACRONYMS

ALSLR	Accelerated Lead Service Line Replacement
CDPHE	Colorado Department of Public Health and Environment
COE	Communications, Outreach and Education
EPA	Environmental Protection Agency
LBD	Learning by Doing
LRP	Lead Reduction Program
LRPP	Lead Reduction Program Plan
LSL	Lead Service Line
OCCT	Optimized Corrosion Control Treatment
Order	Variance Order

INTRODUCTION AND RATIONALE

Denver Water is committed to significantly reducing the lead exposure levels to customers from lead service lines and plumbing. The Lead Reduction Program provides a holistic and permanent lead reduction approach that will significantly reduce lead exposure to our customers and be less harmful to the environment. Implementation of the Lead Reduction Program Plan (LRPP) in accordance with the EPA's Dec. 16, 2019, Variance Order (Order) and the Nov. 15, 2019, letter from the Colorado Department of Public Health and Environment (CDPHE) regarding conditional approval of Denver Water's request for modification of optimal corrosion control treatment (OCCT) began in December 2019. The EPA approved the Order for an initial three-year period to provide the opportunity to demonstrate that the LRPP will effectively reduce lead in drinking water over the 15-year period.

The Lead Reduction Program (LRP) includes six elements:

- Corrosion control treatment.
- Lead service line (LSL) Inventory.
- Accelerated Lead Service Line Replacement (ALSLR) Program.
- Filter Program.
- Communications, Outreach and Education (COE).
- Learning by Doing.

Five of the six elements are used to evaluate the overall effectiveness of the program and those results are presented in the separate report submitted to CDPHE and EPA (see Annual Report for 2021). Quantitative performance metrics were not identified in the Order for the LRP's sixth element, Learning by Doing.

The following commitments have been made as part of the Learning by Doing element of the LRP:

- Establish a Stakeholder Advisory Committee to provide input on efficient and effective ways to implement the LRP and achieve the Order goals.
- Evaluate the performance of the LRP to improve outcomes.

The Learning by Doing element is incorporated to improve outcomes during the life of the LRP.

METHODOLOGY

The Learning by Doing element uses data in collaborative recurring cycles of collective inquiry and action to achieve improved LRP results. The process used in the Learning by Doing approach involves the following steps:

- 1) Gather evidence of current results and collaboratively evaluate with stakeholders.
- 2) Develop strategies and ideas to build on strengths and improve results in challenging areas.
- 3) Implement the strategies and ideas.
- 4) Analyze the impact of the changes to discover what was effective and what was not.
- 5) Apply new knowledge in the next cycle of continuous improvement.

A Learning by Doing Log is maintained to document the performance of the LRP and identify efficient and effective ways to implement the program. The approach requires collection and logging of data followed by review of which aspects of the program are working or need refinement.

External stakeholders are used to apply the Learning by Doing process programmatically via the LRP Stakeholder Advisory Committee.

The outcomes tracked in the Learning by Doing Log and the activities of the Stakeholder Advisory Committee are presented in this document as a supplement to the Annual Report for 2021. Preliminary Learning by Doing ideas were presented in the semi-annual reports. Efforts continue to use the Learning by Doing approach to address challenges and improve the effectiveness of the LRP.

STAKEHOLDER ADVISORY COMMITTEE

The LRP Stakeholder Advisory Committee was launched in 2020 to serve as a sounding board and critical conduit of information between the broader community and the LRP. The committee is composed of members from health care organizations, government agencies, civic groups and utility partners who assist in sharing information with their communities and also provide key insights into external communications and engagement strategies to support the success of the LRP.

A list of 2021 committee members was included in the Second Semi-Annual Report for 2021. The Stakeholder Advisory Committee was convened quarterly in 2021. An outline of meeting dates, primary topics and outcomes is shown in Table 1.

TABLE 1. SUMMARY OF 2021 STAKEHOLDER ADVISORY COMMITTEE MEETING TOPICS

Meeting Date	Primary Topics	Outcomes and LRP Modifications
Jan. 14, 2021	<ul style="list-style-type: none"> • Overview of LRP progress in 2020. • Overview of lessons learned in 2020 and resulting program modifications. • Overview of pH adjustment and equivalency model. • Discussion on opportunities to further encourage post-replacement flushing. 	Different tools or keys may be needed to remove aerators for cleaning as part of proper flushing procedures. The flushing video was updated to reflect the potential need for these tools.
April 22, 2021	<ul style="list-style-type: none"> • Update on LRP progress in early 2021. • Detailed review of the 2020 filter adoption survey results. • Discussion on engaging renters and landlords. • Discussion on how to increase water quality sampling kit returns from customers following distribution of sampling kits to committee members ahead of meeting. 	Feedback was provided on the user experience with water quality sampling kits. Feedback was documented for consideration when opportunities arise to update materials.
July 22, 2021	<ul style="list-style-type: none"> • Update on LRP progress through mid-year 2021. • Overview of LRP grassroots and grasstops outreach strategy and partners. Discussion on ideas for potential additional partnership opportunities. 	There is an opportunity to provide program information to new families through healthcare providers. Denver Water partnered with the Denver Health Foundation to provide program information in newborn information packets. This partnership is expected to distribute information to 3,600 new parents annually.
Oct. 21, 2021	<ul style="list-style-type: none"> • Update on LRP progress through late 2021. • Overview of 2022 work areas. • Overview of high-level 2021 filter adoption survey results. 	There is an opportunity to coordinate with CDPHE to promote train-the-trainer sessions on the program for early childcare service providers. This opportunity was flagged for 2022 train-the-trainer sessions.

In 2022, the goal for the Stakeholder Advisory Committee is to meet again quarterly for a total of four meetings. The makeup of the committee is expected to remain the same.

EXAMPLES OF LEARNING BY DOING

Examples from the Learning by Doing are organized by LRP element with examples related to health equity and environmental justice identified separately. Each Learning by Doing example is presented by title, by the type of desired impact, and a description of the issue and opportunity for learning or change. As shown in Table 1, 15 examples of Learning by Doing are

included in this submission in addition to four examples included in the First and Second Semi-Annual Reports for 2021.¹ The 15 examples address improvements related to improving the customer experience, protecting public health and/or improving the efficiency of the LRP. Additional examples are described in the semi-annual reports.

TABLE 2. OVERVIEW OF LEARNING BY DOING EXAMPLES

LRP Element	Number	Description	Desired Impact
Corrosion Control Treatment	LBD1	Improving return rates for investigative water quality sampling kits.	Protect public health. Improve program efficiency.
	LBD2	Optimizing communication with 1983 to 1987 homes.	Protect public health.
LSL Inventory	LBD3	Continuously tracking investigation counts.	Improve program efficiency.
	LBD4	Enhancing protocols to confirm non-lead service lines.	Protect public health. Improve program efficiency.
	LBD5	Using the Predictive Model to select properties for investigative water quality sampling.	Improve program efficiency. Protect public health.
ALSLR Program	LBD6	Managing ownership changes at properties on the Refusal List.	Improve customer experience. Protect public health.
Filter Program	LBD7	Distributing replacement filter cartridges within six months.	Protect public health.
	LBD8	Managing occupancy changes at households enrolled in the Filter Program.	Protect public health. Improve program efficiency.
Communications, Outreach and Education	LBD9	Streamlining customer communications by aligning information regardless of who performs the replacement.	Improve customer experience. Improve program efficiency.
	LBD10	Increasing use of email and robocall outreach to prompt customer action.	Protect public health. Improve program efficiency.
	LBD11	Improving program accessibility through more information and self-serve options.	Improve customer experience. Protect public health.
	LBD12	Increased coordination across team to support distributor partners.	Protect public health. Improve program efficiency.
Health Equity and Environmental Justice	LBD13	Using the Ambassador Program to get more consent forms returned.	Protect public health. Improve program efficiency.
	LBD14	Expanding partnership categories to better match capabilities to LRP needs.	Protect public health. Improve customer experience.
	LBD15	Hosting audience-specific virtual community meetings to target program messaging.	Protect public health.

¹ See First Semi-Annual Report for 2021 submitted on July 9, 2021, and the Second Semi-Annual Report for 2021 submitted on Jan. 7, 2022.

Corrosion Control Treatment

LBD1: Improving Return Rates for Investigative Water Quality Sampling Kits

Water quality sampling is one method used by the LRP to investigate the material of the service line to support the inventory, to verify the material of the service line prior to replacement and to strengthen the ability of the predictive model to identify probable locations for lead service lines. Customer response and kit return is therefore an important contribution to meeting the 1.4% investigation metric. Customers were returning the investigative water quality kits at a rate of approximately 20% and strategies to improve the return rate were implemented. Examples include augmenting initial outreach with both robocalls and emails. In addition, the COE team initiated outreach by phone and email to those customers that were sent pre-LSL replacement test kits that were also scheduled to have their service line replaced in 2021. Based on results through November 2021, return rates are observed to be improving (to approximately 30%).

LBD2: Optimizing Communication with 1983 to 1987 Homes

Of the more than 38,000 customers residing in 1983 to 1987 homes contacted by a direct mailing in fall 2020 and offered water quality sampling, only two homes with formula-fed infants were eligible and enrolled in the Filter Program. To improve response rates in 2021, high-level reminder postcards were sent in the fall of 2021 to the same 1983 to 1987 homes, designed with more engaging content, as well as directions to the Denver Water website for more information. As of Dec. 3, 2021, no additional 1983 to 1987 homes were enrolled in the Filter Program. As part of ongoing communications, outreach and education efforts, community partners were trained on how to answer questions and direct customers to more information on 1983 to 1987 homes. Distributors and elected officials also received information on 1983 to 1987 homes and information remains available on the program website.

LSL Inventory

LBD3: Continuously Tracking Investigation Counts

Investigations are used to address service lines designated as suspected or possible lead in the inventory while also generating a list of properties available for replacement. The results from investigations support multi-year work planning and prioritization efforts that commence in early summer for the following year. In the first 18 months of the LRP, the number of investigations performed and processed was tracked manually, typically coinciding with quarterly reporting obligations. This approach posed a risk to the LRP, such as conflicts in p-value reporting, delays in ALSLR task order closeout, and inconsistent customer communication. For the latter half of 2021, the frequency of processing and reporting investigations was increased to weekly, ultimately providing better line of sight on achieving the compliance metric for investigations (1.4% each year) in addition to supporting task order planning for the ALSLR Program.

LBD4: Enhancing Protocols to Confirm Non-Lead Service Lines

Investigations based on desktop reviews of service lines are used to determine the material of the service line by analyzing available records, such as parcel year, tap year, and documentation available from hand-written maintenance records and plumbing permits. Results are reviewed as part of weekly desktop review check-ins. In some cases, the service line material determination cannot be made from desktop methods alone. For these cases, additional investigations are performed using water quality sampling, potholing, and/or observations of the interior connection. Direct evidence of non-lead gathered through these methods, in conjunction with the available desktop information, can result in a determination of the service line material that could not have been made otherwise.

LBD5: Using the Predictive Model to Select Properties for Investigative Water Quality Sampling

The current understanding of where lead services are likely to be found is documented in the inventory. However, trends in lead occurrence as revealed or learned from recent field investigations and replacements cannot be easily identified from the inventory. Instead, the predictive model is used to systematically review data available in the database to describe the multiple attributes for each property and its service lines. The predictive model is trained on field data specifically to identify patterns in lead service line discovery. In 2021, properties were identified where the inventory and the predictive model differed in their expectations of lead occurrence – specifically where the inventory indicated lead was likely to be found and where the predictive model indicated lead was unlikely to be found. To better understand and address this disagreement between the inventory and the predictive model, a section of Harvey Park was identified for additional review with 20% of properties investigated using water quality and potholing. Of the investigated properties, only one was confirmed as lead, although several had galvanized pipe downstream of copper pipe and therefore confirmed the designation of non-lead in the predictive model. In 2022, this approach of identifying areas where the predictive model indicates lead is unlikely will be expanded to remove properties more efficiently from the inventory. The feasibility of using the predictive model in place of additional verification potholes is being evaluated in 2022 and is expected to reduce the resources necessary to determine the service line material (e.g., where an inspection of the interior connection or a water quality result is unavailable).

ALSLR Program

LBD6: Managing Ownership Changes at Properties on the Refusal List

Per clause 4.H of the Order, when an ownership changes at a property on the Refusal List, three attempts to obtain consent from the new owner to replace the lead service line must be completed within 91 days of the change in ownership. Depending on the circumstances unique to each property, 91 days is not always enough time to react to an ownership change and make three attempts to contact the new owner. For example, after the title company

communicates a change in ownership, it can be weeks or months before the new owner takes occupancy.

In 2021, a change in ownership occurred at 4,797 properties and of those, 123 properties were or still are on the refusal list. Requests for consent from the new owners were mailed out to all 123 properties using both the premise address and the mailing address on record. Three attempts at contact were made within 91 days at all properties with an ownership change before September 30, although the response rate from new owners is less than observed on the program as a whole. Half of the properties on the refusal list with an ownership change did not respond to the request for consent. Of the 63 properties that did respond, only one of the new property owners withheld consent and 20 properties either had their lead service line replaced or were confirmed non-lead and were subsequently removed from the program.

To expedite the process to obtain consent to replace the service line as part of the ALSLR Program, ownership changes were linked to the occupancy change list used by the Filter Program, which is updated weekly. Following the initial attempt at contact, changes must be manually tracked due to the complexity of timing and circumstances that can occur (for instance, multiple ownership changes within 91 days). Messaging was also crafted to outline for customers that while we are seeking consent, the service line replacement may need to be performed at a later date, depending on whether contractors are actively working in the area nearby or in an area identified for work in a later year of the LRP.

Filter Program

LBD7: Distributing Replacement Filter Cartridges Within Six Months

Replacement cartridges are mailed to customers following the replacement interval recommended by the manufacturer (i.e., every six months). To distribute replacement filter cartridges twice a year to the approximately 100,000 households enrolled in the Filter Program, batches of approximately 7,000 filters are distributed every week. A number of factors can cause the replacement filter cartridge to arrive late, or not all, and when this happens, Tier 2 notice is required as described in the Order by clause 5.B. This poses a continuous risk to compliance based on the weekly distribution of replacements. To reduce this risk, improvements were made to the program database to identify and flag for action the properties for which items are mailed back to Denver Water as returned-to-sender. Additionally, outreach was modified to ask customers to proactively alert Denver Water and request a new replacement cartridge if they notice that they have not yet received it. In 2022, an online form will be used for customers to request a new filter kit, new pitcher or replacement filter cartridge through the program website, adding to the option to contact Denver Water Customer Care directly. The distribution and timeliness of replacement filter cartridges continues to be monitored, and although the risk of non-compliance remains, it has been reduced by these modifications.

LBD8: Managing Occupancy Changes at Households Enrolled in the Filter Program

There were 5,372 occupancy changes in 2021. When a change is made to the customer account indicative of an occupancy change, LRP education materials must be delivered to the new occupants within two weeks, followed by the delivery of a filter pitcher and supply of replacement filter cartridges within 35 days (as described in clause 5.C).² The time needed to identify a change in occupancy and distribute the materials can take more than the mandated two week or 35-day periods, particularly for properties with accounts not managed by Denver Water (such as distributor areas) or multi-unit properties where external parties are relied upon for occupancy change information. In addition to the late delivery of materials, occupancy changes can also result in materials being delivered to a property before the new occupants have moved in. When this occurs, materials and filter kits have been stolen from doorsteps and ultimately must be hand-delivered to the customer as they are able to identify that their property is enrolled in the program. To address this, educational materials and filter kits are provided in bulk to participating building managers and/or leasing offices of larger multi-unit buildings, with distribution handled by the building manager when the new occupants move in.

Communications, Outreach and Education

LBD9: Streamlining Customer Communications by Aligning Information Regardless of Who Performs the Replacement

Customers are less interested in the planning and logistical differences between service line replacements completed by Denver Water construction teams and those completed by contractors, instead preferring higher-level, streamlined communications on the replacement process. In response, an approach was developed to align messaging, materials and communications around LSL replacement regardless of who performs the work. To make the customer experience more consistent, the following improvements were implemented: an interactive construction map was developed to include both contractor and Denver Water work, neighborhood meetings were coordinated to provide information on all replacement work, customers with replacements scheduled by either contractors or Denver Water were included in a virtual construction preparedness meeting, Nextdoor was used to share joint construction updates, comprehensive construction FAQs were added to the Denver Water website, and materials were updated to create identical versions for all customers, mirroring the process for properties where work is performed by the contractors.

LBD10: Increasing Use of Email and Robocall Outreach to Prompt Customer Action

While direct mailings have been successful to reach most customers, additional outreach methods, including emails and robocalls, were used in 2021 to evaluate the effectiveness of different methods on reaching customers who do not respond to initial mailings from the LRP. Email reminders were used to encourage the return of water quality sampling kits, obtain the service line replacement consent forms, and to reach customers whose initial filter kit did not

² As reported in the First and Second Semi-Annual Reports for 2021, LRP introduction mailings and filter kits were distributed within two weeks and 35 days, respectively.

have a confirmed delivery. Robocalls were also used to reach this group and to encourage the return of consent forms. In 2022, emails and robocalls will continue to be used to encourage program participation with continued monitoring of their effectiveness.

LBD11: Improving Program Accessibility Through More Information and Self-Serve Options

To provide customers with more options to access information and have their requests fulfilled, additional content was added to the LRP website and opportunities to use digital forms were identified.

- In 2021, a new section of the LRP website was created to house comprehensive water quality sampling information including kit requests, how to collect samples and understanding results.
- Additional forms will be made available online in 2022, including forms to request a new filter kit, new pitcher filter or replacement filter cartridge.
- A digital version of the lead service line replacement consent form will be made available, also in 2022.

Each of these tools is expected to streamline customer requests, be it for filter replacements as they arise outside of the regular distribution schedule, water quality sampling to identify lead, or to strengthen the ability to get consent forms signed and logged in a more efficient and timely manner.

LBD12: Increased Coordination Across Team to Support Distributor Partners

Customers residing in distributor areas require additional coordination and outreach to encourage participation in the LRP. Some distributor customers may be aware of their relationship to Denver Water while others may only interact with a distributor. Potential gaps and corresponding opportunities to enhance distributor-related communications were identified for implementation in 2022, including outreach to encourage the return of water quality sampling kits, additional reminders to support the timely exchange of information for occupancy changes at properties in distributor areas and more proactive outreach to determine when distributors' capital improvement projects may align with LRP work to allow Denver Water and distributors to efficiently and effectively coordinate on COE efforts and construction activities.

Health Equity and Environmental Justice

LBD13: Using the Ambassador Program to Get More Consent Forms Returned

The Ambassador Program has been a successful model for engaging community partners to support outreach on the LRP in priority communities. Completed and returned consent forms are necessary to allow the replacement work to proceed while crews are still active in a neighborhood. When the Elyria Swansea neighborhood was identified as having a lower rate of return for consent forms, a community partner with ties to that neighborhood was tasked with conducting additional consent form outreach through phone calls, email and door-knocking.

Following this additional level of outreach, the consent form return rate in the neighborhood increased by nearly 10%. Based on this success, consent form outreach is being integrated into community partner planning for 2022.

LBD14: Expanding Partnership Categories to Better Match Capabilities to LRP Needs

As the LRP progresses, it is clear that some community organizations are better positioned to partner in LRP outreach through small-scale or short-term efforts while other organizations are better suited to serve as contracted partners with ongoing activities throughout the year. To address these differences while still leveraging the participation of a broad group of community organizations, the Ambassador Program was modified to include three categories of partnership: contract partners, sponsorship awards and information partners. This was done to provide more flexibility within the Ambassador Program to select the most appropriate partnership model for organizations based on their resources and capabilities as well as the needs of the LRP. The new categories for partnering and associated approaches maximize impact while streamlining the process to identify and onboard partners and track their progress.

LBD15: Hosting Audience-Specific Virtual Community Meetings to Target Program Messaging

In 2020, a series of bilingual virtual community meetings were held to provide an overview of the LRP with community members. In 2021, more topic-specific bilingual virtual community meetings delivered simultaneously in both English and Spanish were held to provide detailed information on specific elements of the program. Topics included what to expect during construction for service line replacement and proper filter use. Additionally, a meeting targeting only Spanish speakers was held to provide the most relevant and culturally responsive information for that group. In total, six topic-specific virtual community meetings were held in 2021 with nearly 5,700 participants. A similar approach will be employed in 2022.

LEARNING BY DOING PROCESS UPDATES FOR 2022

The Learning by Doing process itself can benefit from review and modification. The timing of the Learning by Doing review and how learnings are captured have been adapted for each LRP element. In 2022, coordination will be scheduled on a semi-annual basis to review the learnings and address modifications in a manner that consistently brings together the program elements and reflects the holistic philosophy of the LRP.