

# DENVER WATER LEAD REDUCTION PROGRAM

## SEMI-ANNUAL REPORT – 2024

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**Presented by:** Denver Water



# ISSUE AND REVISION RECORD

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## LIST OF ACRONYMS

µg/L	micrograms per liter
mg/L	milligrams per liter
ALSLR	Accelerated Lead Service Line Replacement
CASS	Coding Accuracy Support System
CCT	Corrosion control treatment
CDPHE	Colorado Department of Public Health and Environment
COE	Communications, Outreach and Education
CPL	Copper plumbing with lead solder
EPA	Environmental Protection Agency
FFLSLP	Federally Funded Lead Service Line Program
GRR	Galvanized requiring replacement
HE&EJ	Health equity and environmental justice
LCR	Lead and Copper Rule
LCR Variance	Dec. 16, 2019, Variance Order
LCRR	Lead and Copper Rule Revisions
LCRR Variance	Nov. 30, 2022, Variance Order
LIMS	Laboratory Information Management System
LRP	Lead Reduction Program
LRPP	Lead Reduction Program Plan
LSL	Lead service line
LSLR	Lead service line replacement
NSF	National Sanitation Foundation
OCCT	Optimal corrosion control treatment
QA/QC	Quality Assurance / Quality Control
T&D	Transmission and Distribution
WTP	Water treatment plant
2024 ALSLR Plan	2024 planned replacements (regardless of funding source)



# EXECUTIVE SUMMARY

Denver Water is committed to reducing the lead exposure levels to customers from lead service lines (LSLs) and plumbing. In December 2019, Denver Water began the process of implementing the Lead Reduction Program (LRP) in accordance with the Environmental Protection Agency (EPA)'s Dec. 16, 2019, Variance approval of Denver Water's request for modification of optimal corrosion control treatment (OCCT) under the Lead and Copper Rule (LCR). In 2022, Denver Water sought a new Variance under the Lead and Copper Rule Revisions (LCRR) and currently implements the LRP under the updated Nov. 30, 2022, Variance. Additionally, in late 2022, Denver Water received funding for lead service line removal made possible by the Bipartisan Infrastructure Act, which dedicated federal funds specifically for lead service line removal. These funds are being used to increase the total number of lead service lines replaced in 2023, 2024 and 2025. In that time, Denver Water aims to replace approximately 5,600 additional lead service lines made possible using the federal funds. From the perspective of the public, everything is under the larger umbrella of the Lead Reduction Program. For the purposes of reporting, the work completed using federal funds is treated separately from the Lead Reduction Program. However, in some sections of the report, references to the *federal plan* may occur regarding investigations, LSL replacements and COE activities. Copies of the reports related to the use of federal funds for lead service line replacement are available upon request.

The LRP provides a holistic and permanent lead reduction approach that will significantly reduce lead exposure to customers and be less harmful to the environment than orthophosphate treatment. The semi-annual report for 2024 presents the performance of the LRP for Jan. 1 through June 30, 2024, as implemented per the Lead Reduction Program Plan (LRPP). The Nov. 30, 2022, Variance went into effect Jan. 1, 2023, and all results presented in this report for Jan. 1 through June 30, 2024, fall under its jurisdiction.

From Jan. 1 through June 30, 2024, the following have been achieved:

- Results from lead sampling indicate that lead levels have stabilized around 4 µg/L at homes with lead service lines and homes with copper plumbing with lead solder and have decreased lead levels from the continuously maintained elevated pH (8.8 ± 0.3) in the distribution system. The 90th percentile lead levels continued to be measured at less than 5 µg/L in 2024.

**TABLE ES-1. CCT PERFORMANCE BASED ON OVERALL 90<sup>TH</sup> PERCENTILE LEAD CONCENTRATION**

LCR Six Month Sampling Period	2019	2020	2021	2022	2023	2024
Spring Overall 90 <sup>th</sup> Percentile Lead Concentration (µg/L)	10.0	6.7	4.1	3.9	3.5	4.0 <sup>1</sup>
Fall Overall 90 <sup>th</sup> Percentile Lead Concentration (µg/L)	11.0	4.4	4.4	3.8	3.9	--

<sup>1</sup> The 90th percentile Spring 2024 lead concentration as approved by CDPHE in their July 24, 2024, letter.

- A total of 3,989 LSL replacements were completed, meeting 89% of the annual replacement goal of 4,477.
- A total of 7,996 investigations of service lines were completed, using a combination of methods, such as water quality sampling, potholing (small hydro excavations along the service line), interior inspections, predictive modeling and desktop review. The number of investigations surpasses the annual investigation goal of 2,421 (1.4% of unknown service lines).
- Approximately 80% of samples collected from filters in the customers' homes had non-detect lead concentrations, and 98% of samples collected from filters in the customers' homes had lead concentrations under 3 µg/L.

The 2024 annual report will present the results of the equivalency model for the program year 2024. Overall, the performance of the first half of 2024 is on track to meet and/or surpass the performance metrics for the program year.

## PART 1: INTRODUCTION

In 2012, at the end of Denver Water’s annual lead and copper monitoring period, the 90th percentile value for lead levels in tap water was 17 µg/L, exceeding the Lead and Copper Rule (LCR) action level of 15 µg/L.<sup>1</sup> From 2013 through 2017, Denver Water completed several corrosion control studies and adjusted treatment to optimize pH/alkalinity control. Based on these studies, in 2018, the Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Division designated phosphate-based corrosion inhibitor addition (orthophosphate) as the optimal corrosion control treatment (OCCT) and ordered Denver Water to install and operate the designated corrosion control treatment by March 20, 2020. The designation of orthophosphate raised concerns among stakeholders that increased loads of phosphorous from orthophosphate treatment would adversely impact Colorado’s streams and rivers, which were already nutrient stressed, as well as regional wastewater treatment operations, and drinking water treatment supplies. Denver Water was also concerned that orthophosphate treatment would not solve the ultimate public health issue of tackling lead at its source through removal of lead service lines (LSLs).

In response, Denver Water developed a proposal to implement the Lead Reduction Program (LRP) as a holistic alternative treatment technique with a permanent solution to addressing lead in drinking water through the removal of all LSLs within 15 years. To request approval, Denver Water developed a Lead Reduction Program Plan (LRPP) that described how Denver Water planned to implement the LRP if it were approved.<sup>2</sup> On Nov. 15, 2019, CDPHE granted Denver Water’s request to modify the OCCT designated for Denver Water in accordance with § 11.26(3)(d)(iii) of the Colorado Primary Drinking Water Regulations, 5 CCR §§ 1002-11, et seq., subject to the Environmental Protection Agency (EPA)’s approval of Denver Water’s variance request. Subsequently, on Dec. 16, 2019, EPA granted the Variance to Denver Water from OCCT pursuant to § 1415(a)(3) of the SDWA, 42 U.S.C. § 300g-4, and 40 C.F.R. § 142.46 for a three-year term beginning Jan. 1, 2020.<sup>3</sup>

In 2022, Denver Water sought a new Variance under the Lead and Copper Rule Revisions (LCRR). On Nov. 30, 2022, EPA issued a new variance that allows Denver Water to continue to implement the LRPP as an alternative treatment technique for the remaining 12 years of the program through Jan. 1, 2035. Denver Water currently implements the LRPP under the updated Nov. 30, 2022, Variance (LCRR Variance).<sup>4</sup> All references to the Variance throughout this report are for the LCRR Variance, which the Denver Water LRP operates under, as of Jan. 1, 2023.

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<sup>1</sup> Note: There have been no exceedances of the 90th percentile calculation under the LCR since 2012.

<sup>2</sup> See Denver Water’s [lead webpage](#) for more information on how the LRP is currently implemented and the [resource page](#) for all supporting documentation of the LRP.

<sup>3</sup> See Denver Water’s [2019 Variance](#) for more details.

<sup>4</sup> See Denver Water’s [2022 Variance](#) for more details.

In December 2019, Denver Water began the process of implementing the Lead Reduction Program Plan (LRPP) in accordance with EPA's Dec. 16, 2019, Variance (LCR Variance) approval of Denver Water's request for modification of OCCT under the LCR.

Denver Water met or surpassed all performance metrics required as part of the LCR Variance in the first four years of the program:

- Results from LCR compliance sampling indicate that lead levels have stabilized around 4 µg/L.
- Since the implementation of corrosion control treatment (CCT) in March 2020, the 90th percentile lead levels have continuously been measured at less than 5 µg/L.
- By the middle of 2024, over 26,000 LSLs have been replaced, over 15,000 of which are in areas designated as having equity also referred to as health equity and environmental justice (HE&EJ) concerns.
- As part of the Filter Program, all customers who have a likely or confirmed LSL are provided a pitcher filter kit and continue to be supplied replacement cartridges, per the manufacturer's recommendations.
- Consistently, the filter adoption survey has shown an adoption rate of over 80%.

This semi-annual report was prepared in compliance with paragraph 7.B of the LCRR Variance and commitments made by Denver Water in the 2019 LRPP. This report addresses the first six months of 2024 for the period of Jan. 1, 2024, through June 30, 2024.

The following plans are referenced throughout this report:

- LRPP (submitted Sept. 16, 2019, and approved Dec. 16, 2019) and its amendment (submitted July 17, 2023).
- 2024 Accelerated Lead Service Line Replacement (ALSLR) Plan (not a formal submission, identifies all properties planned for replacement in 2024).
- 2024 Communications, Outreach and Education (COE) Plan (submitted Feb. 10, 2024, alongside the 2023 Annual Report).
- Elevated Lead Response Plan (re-submitted July 6, 2021).
- Corrosion Control Treatment (CCT) Implementation Plan (re-submitted June 4, 2020).
- Nitrification Control Plan (re-submitted July 15, 2021).

*B. Reporting and Recordkeeping. All of the requirements of the LCRR other than the definition of OCCT as the term relates to 40 C.F.R. § 141.82(e) remain in effect, including the reporting and recordkeeping requirements. In addition, Denver Water shall record, maintain records of, and report the following information to CDPHE and EPA every six months on February 10 and August 10, except as noted below. Denver Water will provide any of the raw data to CDPHE and EPA, within 30 Days, when requested.*

*Text is taken verbatim from the LCRR Variance, dated Nov. 30, 2022.*

## **What to Expect: Reporting on Program Activities**

The purpose of the semi-annual and annual reports is to document the implementation of the LRP, describe the actions taken by Denver Water to reduce lead levels and support the subsequent evaluation of the LRP performance.

The performance data included for the different elements of the LRP described in this report vary depending on the launch date of the different program elements (see Table 1). The reporting dates for the different program elements are shown in Table 2. In general, data are detailed for the first six-month period of 2024, with the exception to provide additional information not included in previous reports.

**TABLE 1. WHAT TO EXPECT IN THIS REPORT**

<b>Paragraph (and LRP Task)</b>	<b>What to Expect in this Annual Report and Status</b>
<b>7.B.i CCT</b>	This section includes a summary of CCT results for the first six months of 2024.
<b>7.B.ii LSL Inventory</b>	Denver Water first published the LSL Inventory on its website on March 5, 2020. The map was updated on the Denver Water website on July 30, 2024, using data current up to June 30, 2024.
<b>7.B.iii LSL Replacements (aka ALSLR Program)</b>	This section summarizes the number and type of replacements completed. Denver Water crews have been replacing lead service lines since Jan. 1, 2020. Contractors started lead service line replacement on March 5, 2020.
<b>7.B.iv Filters (aka Filter Program)</b>	This section summarizes filter distribution. Initial filter distribution was completed by Sept. 21, 2020. Replacement filter distribution was initiated on July 1, 2020, and continued through 2024.
<b>7.B.v Compliance Metrics</b>	The Equivalency Model is updated using data collected for the program year. This information will be presented in the 2024 Annual Report.
<b>7.B.vi Communications, Outreach and Education</b>	This section describes implementation of the 2024 COE Plan, <sup>1</sup> virtual community meetings, engagement with the Stakeholder Advisory Committee, and development of new customer resources and materials.
<b>7.B.vii Health Equity and Environmental Justice</b>	This section summarizes implementation of the 2024 COE Plan including updates on activities to support increased equity, community partnerships and outreach.
<b>Appendices</b>	Appendices include CCT, LSL inventory, water quality results, LSL replacements, customer refusal lists, COE and HE&EJ.

<sup>1</sup> See Appendix COE-14 2024 COE Plan in the 2023 Annual Report (submitted Feb. 9, 2024).

**TABLE 2. DATES FOR DATA INCLUDED IN THE SEMI-ANNUAL REPORT FOR 2024**

Description	Semi Annual Report (2024)
<b>LCR 90<sup>th</sup> Percentile Lead Concentration based on Compliance and Customer Requested Samples</b>	All LCR compliance samples collected from Jan. 1 to June 30. All customer requested samples reported in LIMS <sup>1</sup> between Jan. 1 and June 30.
<b>Elevated Lead Response Reporting</b>	All results reported in LIMS by June 30 <sup>2</sup> .
<b>Water Quality Sampling from Select Households (1983 to 1987 Homes)</b>	All results reported in LIMS by June 30.
<b>Inventory – Posting of Map to Denver Water’s Website</b>	Data through June 30, 2024. Posted July 30, 2024.
<b>Inventory – Update</b>	Jan. 1 to June 30.
<b>Investigations – Verification Potholing as Part of ALSLR Program</b>	Jan. 1 to June 30.
<b>Investigations – Investigative Potholing Independent of ALSLR Program</b>	Jan. 1 to June 30.
<b>Investigations – Water Quality Sampling as part of ALSLR Program (not included in 90<sup>th</sup> Percentile Calculation)</b>	All results reported in LIMS by June 30.
<b>Investigations – Water Quality Sampling Independent of ALSLR Program (not included in 90<sup>th</sup> Percentile Calculation)</b>	All results reported in LIMS by June 30.
<b>Water Quality Sampling Post-LSL Replacement</b>	All results reported in LIMS by June 30.
<b>ALSLR Program Replacements</b>	Jan. 1 to June 30.
<b>ALSLR Program Consent Forms</b>	Jan. 1 to June 30.
<b>Initial Filter Distribution</b>	Jan. 1 to June 30.
<b>Replacement Filter Distribution</b>	Jan. 1 to June 30.
<b>Filter Program Occupancy Changes<sup>3</sup></b>	Jan. 1 to June 30.
<b>Informal Filter Adoption Survey as Part of ALSLR Program</b>	Jan. 1 to June 30.
<b>Filter Testing in the Field</b>	Jan. 1 to June 30.
<b>COE Activities</b>	Jan. 1 to June 30.

<sup>1</sup> LIMS is the Laboratory Information Management System used by Denver Water.

<sup>2</sup> For samples collected and reported in LIMS by June 30 and follow-up response by June 30, 2024.

<sup>3</sup> Includes occupancy changes at ALSLR properties.

## Performance Dashboard

Denver Water uses a dashboard to communicate key metrics and share the progress of the LRP with the public. The dashboard was most recently posted on Denver Water’s website on July 30, 2024, in both English and Spanish, and currently shows data through June 30, 2024.<sup>5</sup> The dashboard can be accessed from the Denver Water [website](#).

The dashboard of key metrics was modified to provide a more holistic understanding of the performance of the Lead Reduction Program. Specifically, this dashboard now graphically reports additional metrics that include: the health equity and environmental justice (HE&EJ) metric, Lead and Copper Rule (LCR) sampling results tracked since the program began and lead service line replacement progress.<sup>6</sup> To integrate this information into the dashboard, the program milestones list was removed to relieve space. The equivalency model result for the most recent annual report is included and will be updated on an annual basis to demonstrate Denver Water’s Lead Reduction Program continues to be at least as efficient as the optimal corrosion control treatment (OCCT).

### LEAD REDUCTION PROGRAM

Report Period 1/1/2024 to 6/30/2024

### Key Metrics



FIGURE 1. DASHBOARD AS POSTED TO THE DENVER WATER WEBSITE (DATA TO JUNE 30, 2024)

<sup>5</sup> See the 2020 Second Quarterly Report for an explanation of the metrics used in the dashboard.

<sup>6</sup> See Section 7.B.vii.c for details on how the HE&EJ metric is calculated.



## PART 2: REQUIRED REPORTING

### 7.B.i CCT

Section 7.B.i of the LCRR Variance addresses Denver Water’s Corrosion Control Treatment (CCT) recordkeeping and reporting requirements for 2024 for the following parameters:

*i. CCT*

- a. notification to CDPHE and EPA of elevated lead levels and the actions that Denver Water is taking to reduce drinking water exposure to lead at those locations;*
- b. all lead and copper compliance tap sampling results, as required in Subpart I of 40 C.F.R. Part 141 and Section 11.26 of 5 CCR 1002-11, as well as the results of any customer requested samples;*
- c. 90<sup>th</sup> percentile lead levels overall, for LSLs, and for copper with lead solder sites;*
- d. CCT water quality parameters for pH and alkalinity; and*
- e. all lead and water quality results collected as part of Denver Water’s investigation of LSLs and post LSL replacement and service line material of those sites.*

*Text is taken verbatim from the LCRR Variance, dated Nov. 30, 2022.*

Denver Water uses a combination of water quality parameters and lead sampling results to report the performance of CCT. Additional data can be provided upon request.

CCT with pH adjustment is used to manage lead release from lead service lines, as well as homes with copper plumbing with lead solder. Homes with an LSL that opt out of the LRP are also provided some protection through pH adjustment. Denver Water’s LRP webpage has a page dedicated to pH adjustment. The page describes the reasoning of the pH adjustment and how it benefits customers with an LSL or lead in their premise plumbing, answers FAQs and describes any downstream effects. Water treatment to adjust pH above 8.5 (required by the Dec. 16, 2019, Variance) was initiated at the Marston and Foothills Treatment Plants on March 3, 2020; treatment was initiated at the Moffat Treatment Plant when it returned to service on May 1, 2020. The cumulative 90th percentile lead level in the system before the pH change on March 3, 2020, was approximately 13 micrograms per liter (µg/L). After the pH stabilized at 8.8, the lead levels started to decline, eventually stabilizing by August of that same year to a 90th percentile lead concentration below 5 µg/L. The 90th percentile lead levels represent a greater than 60% decrease in lead levels due to CCT implementation.

During this reporting period, Denver Water continued to operate at or near a pH of 8.8 at all three plants. An overview of the CCT requirements per the LCRR Variance and LRPP is described in Table 3.

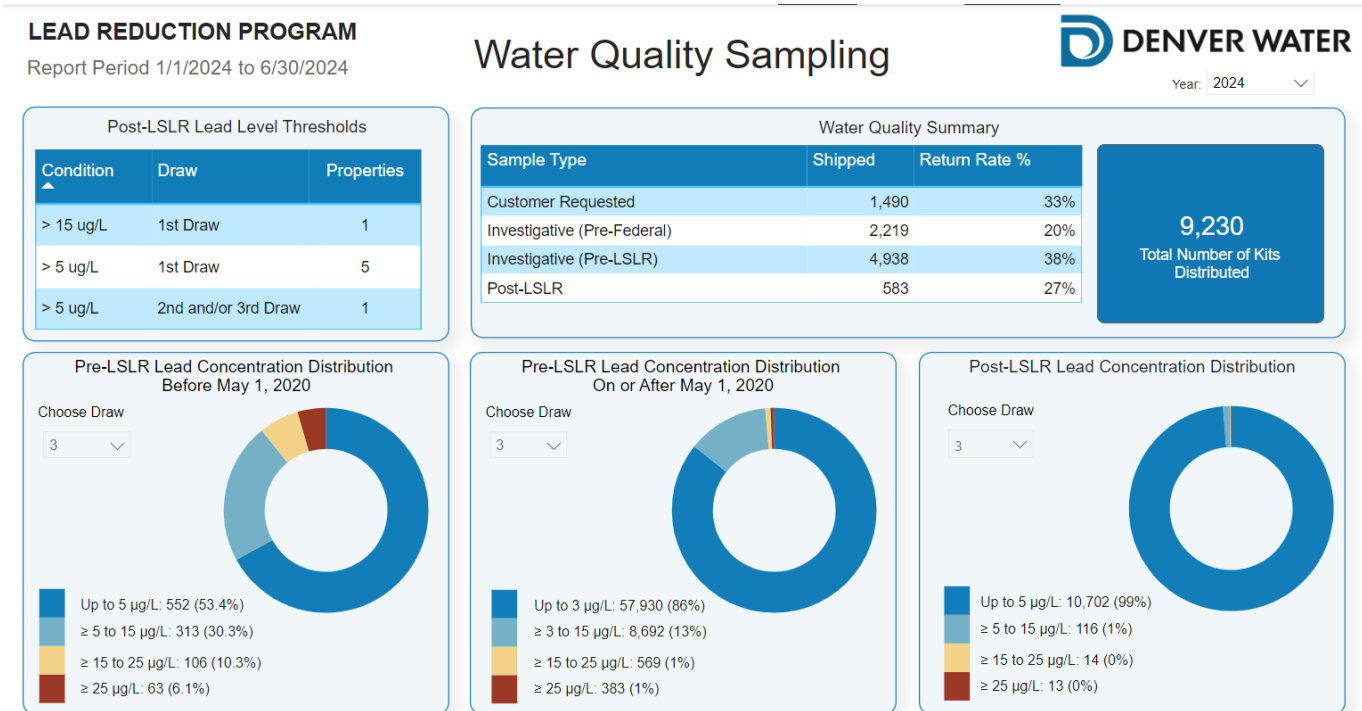
**TABLE 3. OVERVIEW OF 7.B.I REQUIREMENTS**

<b>Paragraph Reference</b>	<b>Description</b>	<b>Refer to</b>
<b>7.B.i.a</b>	Notify CDPHE of elevated lead levels and actions taken by Denver Water to reduce lead exposure.	See Table 4 and Appendix. <sup>1</sup>
<b>7.B.i.b</b>	Lead sampling results per the Lead and Copper Rule and from customer requested sampling.	See Table 6 (90 <sup>th</sup> percentile to date).
<b>LRPP III.E (p 70)</b>	Monthly trending of LCR compliance samples and customer requested samples.	See Table 4.
<b>7.B.i.c</b>	90 <sup>th</sup> percentile lead levels for LSLs and for copper with lead solder sites.	See Table 5.
<b>7.B.i.d</b>	CCT parameters for pH and alkalinity, reported monthly.	See Table 7.
<b>LRPP III.E (p 70)</b>	Install automated pH control loops at all three treatment plants by March 2020.	All three plants have feedback loops in place and are functioning.
<b>7.B.i.e</b>	All lead and water quality sampling results from investigations for LSLs. All lead and water quality sampling results from post-LSL replacement sampling. Note that lead results from investigations and post-LSL replacement sampling are not included in the calculation of the 90 <sup>th</sup> percentile lead concentration.	See Table 9 and Table 10.
<b>LRPP Executive Summary LRPP III.E (p 65)</b>	Targeted communications for select households built between 1983 to 1987 that self-identify as expecting or existing families with formula-fed infants and children up to 2 years of age. Offer water quality sampling; provide filter if lead measured > 3 µg/L (as described in paragraph 5.D).	Described with section 7.B.vi. Outreach materials launched Aug. 21, 2020. See Section 5.D.
<b>LRPP III.E (p 71)</b>	Complete distribution system modeling, evaluating pH, disinfection by-products and water age by Jan. 31, 2020. Submit nitrification control plan by June 30, 2020, to address sampling, monitoring, and flushing.	Submitted July 6, 2020.  Re-submitted July 15, 2021.
<b>Voluntary</b>	Results from continued operation of the pipe racks.	Submitted Feb. 16, 2022.

<sup>1</sup> See Appendix CCT-1 Summary of Response to Elevated Lead Levels (First Six-Month Period of 2024).

Water testing is a simple method for Denver Water and its customers to identify potential risks of lead exposure. Denver Water manages lead and water quality samples via its Laboratory Information Management System (LIMS), with analysis performed by either the Denver Water Quality Lab or a contract lab. The sub-category under which the sample was collected is reported in LIMS, including LCR compliance samples, customer requested samples, customer requested samples from select households built between 1983 to 1987 (self-identifying as a home with a formula-fed infant), pre-LSL replacement investigative water quality samples and post-LSL replacement water quality samples. Denver Water uses a three-bottle test for customer-requested and investigative water quality sampling under the LCRR Variance for consistency with past practices, as the three-bottle technique is a very effective sampling method for finding service line material.

Figure 2 features the water quality sampling dashboard that captures day-to-day tracking of water quality information. Specifically, this dashboard displays the number of properties that exceed post-LSLR lead level thresholds, a summary of water quality sample return rates, and lead concentration results per draw for both pre- and post-replacement, focusing on the third draw sample bottle as an indicator of a lead service line. The specific dashboard below captures the information from Jan. 1 through June 30, 2024 (top half of the dashboard), as well as program to-date (bottom half of the dashboard). The pie charts show the drastic decrease in lead concentrations from before pH adjustment (pre-May 1, 2020), to after pH adjustment (post-May 1, 2020) and post-LSL replacement. Additional details regarding the numbers presented in the dashboard are discussed in Section 7.B.i and 7.B.ii of this report.



Note: Water quality results data is distinguished yearly based on the date the sample was collected & The number of test kits distributed is distinguished yearly based on the date the test kit was sent. The information presented in the dashboard should be used for program management reporting. Regulatory reporting requires additional data review and update prior to the time of submittal.

**FIGURE 2. WATER QUALITY SAMPLING DASHBOARD**

## Summary of Actions Taken to Reduce Drinking Water Exposure to Lead at Locations with Elevated Lead Levels [7.B.i.a]

Per Section 7.B.i.a of the LCRR Variance, Denver Water must provide “notification to CDPHE and EPA of elevated lead levels and the actions that Denver Water is taking to reduce drinking water exposure to lead at those locations.” In 2020, Denver Water set the elevated lead investigative response level at 15 and 25 µg/L in LCR compliance and customer requested samples, respectively, under its Elevated Lead Response Plan approved by CDPHE and EPA. Denver Water continues to sample the first liter under the LCR and will transition to reporting fifth-liter sampling in 2025 to meet the requirements of the LCRR.<sup>7</sup>

All customer-requested samples and LCR samples with first-draw concentrations above 25 µg/L analyzed by month during the first half of 2024 are listed in Table 4.<sup>8</sup> A lead result over 25 µg/L in the first sample bottle for a customer’s home will trigger follow up and investigative sampling, as outlined in the Corrosion Control Treatment Implementation Plan.<sup>9</sup> Lead was measured above 25 µg/L in four samples during the reporting period for the first six months of 2024.

**TABLE 4. COUNT OF PROPERTIES WITH ELEVATED LEAD CONCENTRATIONS IN LCR AND CUSTOMER REQUESTED SAMPLES<sup>1</sup>**

Description (Based on Sampling Date)	January 2024	February 2024	March 2024	April 2024	May 2024	June 2024	Response
<b>Properties with Lead &gt;25 µg/L in first 1 L sample bottle</b>	0	0	1	2	1	0	Reported to CDPHE within 10 days. See Appendix. <sup>2</sup>

<sup>1</sup> Although the Elevated Lead Response Plan applies only to LCR and eligible customer requested samples, the features of the plan are applied to results generated from pre-LSL replacement water quality samples obtained from properties included in the LRP for a consistent customer experience. The actions taken at these properties to investigate elevated lead are described in Appendix CCT-1 per the definition used in the LCRR Variance. Data reflect samples analyzed by June 30, 2024.

<sup>2</sup> See Appendix CCT-1 Summary of Response to Elevated Lead Levels (First Six-Month Period of 2024).

## Lead Sampling Results from LCR Compliance and Customer Requested Sampling and 90<sup>th</sup> Percentiles [7.B.i.b and c]

Per Section 7.B.i.b and 7.B.i.c of the LCRR Variance, Denver Water must provide “all lead and copper compliance tap sampling results, as required in Subpart I of 40 C.F.R. Part 141 and 5 CCR 1002-11.26, as well as the results of any customer requested samples, and 90th percentile lead levels overall, for LSLs, and for copper with lead solder sites.”

Denver Water conducts LCR compliance water quality sampling at Tier 1 sites, which are defined by the LCR as single-family structures that have an LSL or copper plumbing with lead

<sup>7</sup> See EPA’s [Lead and Copper Rule Revisions](#) for more details on sampling methods.

<sup>8</sup> See Appendix CCT-1 Summary of Response to Elevated Lead Levels (First Six-Month Period of 2024) for elevated lead measured in the first bottle of the three-bottle test.

<sup>9</sup> See Corrosion Control Treatment Implementation Plan re-submitted to CDPHE on June 4, 2020.

solder (CPLS) in homes built between 1983 through 1987. The compliance period occurs January through June (Spring) and July through December (Fall). The cumulative 90th percentile lead concentration for LCR compliance samples for the Spring and Fall compliance periods since program inception is presented in Table 5. The 90th percentile calculated from the LCR compliance sampling is not to exceed 15 µg/L, as defined by the action level of the LCR. Data used to calculate the 90th percentile lead concentration align with reporting requirements of the LCR.

**TABLE 5. LCR LEAD CONCENTRATIONS FOR LSL AND CPLS HOMES (SINCE PROGRAM INCEPTION)**

Historical Cumulative LCR Lead Concentrations (µg/L)	2019		2020		2021		2022		2023		2024
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring <sup>1</sup>
<b>Overall 90<sup>th</sup> Percentile</b>	10	11.8	6.7	4.1	4.1	4.3	3.9	3.8	3.5	3.9	4.0
<b>LSL 90<sup>th</sup> Percentile</b>	10	12.4	6.7	4.3	4.1	4.5	4.0	3.9	3.4	3.6	3.8
<b>CPLS 90<sup>th</sup> Percentile</b>	7.8	5.1	4.8	2.9	3.4	2.3	1.2	1.7	1.8	1.7	1.1

<sup>1</sup> The 90th percentile Spring 2024 lead concentration as approved by CDPHE in their July 24, 2024, letter.

Results from customer-requested sampling are included in the overall 90th percentile lead concentration reported in Table 6.

**TABLE 6. SUMMARY OF LCR 90<sup>TH</sup> PERCENTILE LEAD CONCENTRATIONS (JAN. 1 TO JUNE 30, 2024)**

LCR Compliance Results for Lead	Spring 2024 Compliance Period <sup>1</sup>	Result	Number of Homes
<b>LCR Compliance 90<sup>th</sup> Percentile Lead<sup>2</sup></b>		3.8 µg/L	82
<b>Overall 90<sup>th</sup> Percentile Lead Concentration using LCR Compliance + Customer Requested Samples<sup>3</sup></b>		4.0 µg/L	846 (82 + 765)

<sup>1</sup> The 90th percentile Spring 2024 lead concentration as approved by CDPHE in their July 24, 2024, letter.

<sup>2</sup> Includes results for all LCR compliance samples (from 1951 and older homes plus 1983 to 1987 homes with copper piping and lead solder) and reported in LIMS for the Jan. 1 to June 30, 2024, compliance period.

<sup>3</sup> Includes results from customer requested samples reported in LIMS between Jan 1. and June 30, 2024. Sampling to support the ALSLR Program is excluded from the compliance calculation.

## Corrosion Control Treatment Water Quality Parameters for pH and Alkalinity [7.B.i.d]

Per Section 7.B.i.d of the LCRR Variance, Denver Water must provide “CCT water quality parameters for pH and alkalinity.” Chemical feed systems were brought into service for enhanced pH CCT on March 3, 2020, at the Marston and Foothills Water Treatment Plants and on May 1, 2020, at the Moffat Water Treatment Plant. Trends for pH and alkalinity since Jan. 1, 2020, and operating data with adjusted pH since March 2020 can be provided upon request. Data for pH in treated water from the active water treatment plants and the distribution system are summarized in Table 7 based on the lowest daily average pH measured each month from each sampling point. Data for alkalinity in treated water from the active water treatment plants are summarized in Table 8 based on the lowest daily average alkalinity measured each month from each sampling point. On Aug. 13, 2020, Denver Water provided a letter to CDPHE that steady state performance of CCT was achieved in the distribution system. One year of data to describe CCT performance was provided to CDPHE on May 6, 2021, including pH and alkalinity data. The treatment targets for pH and alkalinity in the effluent of the three treatment plants and across the distribution system were announced by CDPHE on June 9, 2021. CDPHE established a target of  $8.8 \pm 0.2$  for pH in treated water,  $8.8 \pm 0.3$  for pH in the distribution system, and alkalinity greater than or equal to 20 mg/L as  $\text{CaCO}_3$ , all effective July 1, 2021.

**TABLE 7. MINIMUM DAILY AVERAGE PH REPORTED EACH MONTH**

Description	January 2024	February 2024	March 2024	April 2024	May 2024	June 2024
<b>Effluent LCRR Variance Requirement</b>	pH 8.8 +/- 0.2 in WTP effluent					
<b>Marston Water Treatment Plant Effluent</b>	8.84	8.83	8.82	8.78	8.82	8.86
<b>Foothills Water Treatment Plant Effluent</b>	8.85	8.83	8.81	8.78	8.82	8.86
<b>Moffat Water Treatment Plant Effluent<sup>1</sup></b>	8.86	-	-	-	-	-
<b>Distribution System LCRR Variance Requirement</b>	pH 8.8 +/- 0.3 in distribution system					
<b>Distribution System</b>	pH levels in the distribution have been within 8.8 +/- 0.3 since March 12, 2020.					

<sup>1</sup> The Moffat Water Treatment Plant went offline on Jan. 8, 2024, and did not return back online in this semi-annual reporting period.

**TABLE 8. MINIMUM DAILY AVERAGE ALKALINITY REPORTED EACH MONTH**

Description	January 2024	February 2024	March 2024	April 2024	May 2024	June 2024
<b>Effluent Variance Requirement</b>	$\geq 20$ mg/L as $\text{CaCO}_3$					
<b>Marston Water Treatment Plant Effluent</b>	76.2	79.1	84.2	72.8	71.0	66.6
<b>Foothills Water Treatment Plant Effluent</b>	69.9	72.7	71.1	67.3	56.2	55.6
<b>Moffat Water Treatment Plant Effluent<sup>1</sup></b>	44.3	-	-	-	-	-

<sup>1</sup> The Moffat Water Treatment Plant went offline on January 8, 2024, and did not return back online in this bi-annual reporting period.

## Water Quality Sampling Results from Pre-LSLR Sampling [7.B.i.e]

Per Section 7.B.i.e of the LCRR Variance, Denver Water must provide “all lead and water quality results collected as part of Denver Water’s investigation of LSLs and post-LSL replacement and service line material of those sites.” Results from water quality sampling can provide an indication of lead at single-family residential properties and, when reviewed with additional results from field methods, the status of a service line can be changed in the inventory (i.e., from unknown to confirmed LSL).<sup>10</sup> The three-bottle tests are performed to aid in the classification of service line materials of properties within Denver Water’s integrated service area to provide the following:<sup>11</sup>

- To confirm the service line material before LSL replacement at properties included in the 2024 ALSLR task orders where lead has not been confirmed (i.e., p-value<sup>12</sup> < 1<sup>13</sup>).
- To inform the inventory and predictive model at properties in the City and County of Denver and in distributor areas with a likely LSL (i.e., p-value  $\geq 0.5$  and < 1).
- To validate customer comments on the presence (or absence) of an LSL and requests to opt into (or out of) the LRP.

Lead results over 3 µg/L in the second or third sample bottle of the three-bottle test triggers a review of inclusion in the LRP, and the property will be added to the list for LSL replacement and added to the Filter Program, if not already enrolled.<sup>14</sup> A summary of the water quality results prior to LSL replacements is presented in Table 9. Due to a delay in data transition, 263 samples analyzed in December 2023 were not reported in LIMS before the Dec. 31, 2023, cutoff date for reporting.<sup>15</sup> The maximum lead concentration measured year-to-date was 2,140 µg/L in the first bottle of samples collected at a single-family property in May 2024; Denver Water conducted an investigation at this property, and it was determined that there was a three-week stagnation period prior to sampling and the samples were collected at the meter pit and not an interior faucet. This property is currently vacant, under construction, and the internal

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<sup>10</sup> See Section 7.B.ii LSL Inventory for more details.

<sup>11</sup> Details and results for pre-LSL replacement sampling efforts can be provided upon request.

<sup>12</sup> In the 2019 LRPP, Appendix III.B.2 Preliminary Identification of Lead Service Lines defines “p-value” as the probability that the service has some lead materials. For example, a p-value of 0 indicates that the service line does not contain lead, and a p-value of 1 indicates that a service line does contain lead. For p-values of 0.5, half of the service lines would be expected to contain lead. The p-value will be used to produce a numeric estimate of the total number of LSLs in the Denver Water service area.

<sup>13</sup> Since July 22, 2020, sampling kits are sent to properties with a p-value of 0.5 to 0.9. Service line material is verified at any property with a p-value < 1 in the field before replacement, using visual inspection of materials at the interior connection and/or potholing on the exterior.

<sup>14</sup> The threshold used as an indicator for a lead service line was reduced to reflect the impact of corrosion control treatment with pH adjustment on lead release measured in water quality samples. Samples collected on May 1, 2020, and after with lead measured equal to or greater than 3 µg/L are considered indicative of a lead service line. Samples collected prior to May 1, 2020, are assessed using the original threshold of 5 µg/L.

<sup>15</sup> See Appendix INV-4 Water Quality Investigations (First Six-Month Period of 2024) for these results.

plumbing has yet to be installed. Multifamily residences with five or more units that request a water quality kit are sent a one-bottle sampling kit and are included in Table 9.

**TABLE 9. SUMMARY OF WATER QUALITY RESULTS PRE-LSL REPLACEMENT AT SINGLE-FAMILY RESIDENCES USING THE THREE-BOTTLE TEST**

Water Quality Sampling for Investigation (pre LSL Replacement)	Result for 2024 Year to Date	Unit
<b>Total Number of Kits Mailed Out<sup>1</sup></b>	7,159	Kits
<b>Total Number of Kits Received and Analyzed to Investigate the Service Line Material<sup>2</sup></b>	2,825	Kits
<b>Maximum Lead Concentration Measured Year-to-Date</b>	2,140	µg/L
<b>Average Lead Concentration (in second and third bottles only)<sup>3</sup></b>	2.08	µg/L

<sup>1</sup> If a sampling kit is re-sent to a property, the additional distribution of the water quality kit is counted on top of the original distribution count. Total includes one one-bottle kit.

<sup>2</sup> As reported in LIMS by June 30, 2024.

<sup>3</sup> If a value was reported as less than the detection limit (i.e., < 1 µg/L) the measured value was taken as 0.5 µg/L for calculation of the average concentration.

### Water Quality Sampling Results for Post-LSL Replacement [7.B.i.e]

Per Section 7.B.i.e of the LCRR Variance, Denver Water must provide “all lead and water quality results collected as part of Denver Water’s investigation of LSLs and post LSL replacement and service line material of those sites.”

For LSL replacements completed prior to Dec. 31, 2019, letters were mailed to customers to offer post-replacement sampling four months after LSL replacement to single-family, multifamily and commercial properties. Customers could then call Denver Water to request a sampling kit. This process was discontinued on April 2, 2020.

For LSL replacements completed between Jan. 1 and Dec. 31, 2020, single-family residential property customers were automatically mailed a three-bottle sampling kit approximately four months after replacement and multifamily and commercial properties were mailed a letter offering post-LSL replacement sampling inviting the customer to request a sampling kit. The letter was sent to every unit in a multifamily building.

For LSL replacements completed after Jan. 1, 2021, all single-family, multifamily and commercial properties receive an offer letter for post-LSL replacement sampling approximately four months after LSL replacement.<sup>16</sup> Per the LCRR Variance, these properties must receive a water quality sampling offer within six months post-LSL replacement. Sending offers to customers four months post-LSL replacement allows the offer to make its way through the mail system to the customer prior to the six-month deadline. If the customer elects to participate, single-family properties receive a three-bottle sampling kit and multifamily and commercial properties receive a one-bottle sampling kit. A summary of post-LSL replacement sampling offers

<sup>16</sup> See Appendix CCT-2 Post LSL Replacement Sampling – Summary of Completed Offer to Test (Cumulative since Program Inception).



is provided in Table 10. Due to a delay in data transition, 28 samples analyzed in December were not reported in LIMS by the Dec. 31, 2023, date.<sup>17</sup>

As of May 2024, single-family properties with replacements completed by Denver Water crews will receive offer letters instead of automatically mailing a three-bottle sampling kit, with offer letters continuing to be mailed to all other residential multifamily and commercial properties.

**TABLE 10. SUMMARY OF POST-REPLACEMENT SAMPLING OFFERS AND WATER QUALITY (JAN. 1 THROUGH JUNE 30, 2024)**

Water Quality Sampling after LSL Replacement	Count <sup>1</sup>						TOTAL
	Jan 2024	Feb 2024	March 2024	April 2024	May 2024	June 2024	
<b>Total Number of Letters Mailed to Offer Post-LSL Replacement Sampling<sup>2,3,4</sup></b>	755	963	691	506	1,189	1,023	5,127
<b>Total Number of Kits Mailed Out<sup>2,3</sup></b>	146	155	158	105	32	16	612
<b>Total Number of Kits Received and Analyzed to Confirm post-LSL Replacement Water Quality<sup>2,5</sup></b>	47	42	45	59	41	6	240
<b>Total Number of Kits Received and Analyzed to Confirm post-LSL Replacement Water Quality Not Previously Reported<sup>6</sup></b>	29						
<b>Number of Properties with Lead &gt; 15 µg/L in First Bottle<sup>2</sup> (triggers additional investigation effort)</b>	0	0	0	1	0	0	1
<b>Number of Properties with Lead ≥ 5 and &lt; 15 µg/L in the Second and/or Third Bottle<sup>2</sup> (triggers additional investigation effort)</b>	0	0	0	1	0	0	1
<b>Number of Properties with Lead ≥ 5 and &lt; 15 µg/L in First Bottle<sup>2</sup> (triggers customer education)</b>	0	1	3	1	0	0	5

<sup>1</sup> Counts are based on the month of sample collection, per the LCRR Variance. Not applicable to “Total Number of Letters Mailed to Offer Post-LSLR Replacement Sampling” or “Total Number of Kits Mailed Out”, which are based on the date of mailing.

<sup>2</sup> Applies to single-family and multifamily residences.

<sup>3</sup> If a duplicate letter or sampling kit was sent to a property/customer, it is counted twice.

<sup>4</sup> The count for June 2024 includes 157 properties that received service line replacements prior to this reporting period but did not receive post-replacement sampling offers.

<sup>5</sup> Total number of kits analyzed refers to results available in LIMS by June 30, 2024, with samples collected since January 1, 2024.

<sup>6</sup> One water quality sample collected in November 2023 and 28 water quality samples collected in December 2023 not previously reported.

Seven properties with a completed service line replacement during this reporting period did not receive an offer letter or sampling kit and required additional review due to the replacement being performed by a third party, data discrepancies, tap status changes, mailing address errors, etc. In many circumstances, a homeowner or contractor elects to replace a service line as part of redevelopment or renovation, a process that can take several months to

<sup>17</sup> See Appendix INV-4 Water Quality Investigations (First Six-Month Period of 2024) for these results.

complete. Once the replacement is confirmed, a water quality sampling kit or offer letter is sent to these properties. All properties requiring an offer received their offer letter within the six-month post-replacement timeline. A detailed list of properties that did not receive the offer and explanation is provided in Appendix CCT-3, including follow-up activities.<sup>18</sup>

Mailing lists for letters offering post-replacement sampling are created every month by compiling a list of properties from the inventory where the p-value status changed to 0 due to replacement of the LSL three months prior to the month the mailing list is created. The Quality Assurance/Quality Control process to determine valid addresses includes evaluating who completed the replacement (i.e., Denver Water crews or ALSLR contractors), if the property is CASS<sup>19</sup> certified and the initial status of the property in the inventory.

### Water Quality Results from Select Households (1983 to 1987 Homes) [5.D]

Section 5.D of the LCRR Variance provides that:

*... If a child up to 24 months of age resides in a Select Household and the water quality results in the first draw sample show lead concentrations above 3 ppb, Denver Water must offer a filter and enough replacement filters and cartridges, at no cost, to the customer until the child exceeds the age of 24 months.*

*Text is taken verbatim from the LCRR Variance, dated Nov. 30, 2022.*

Outreach to customers residing in all households built between 1983 and 1987 was launched in August 2020, with a second round of outreach performed in November 2021. “Select households” are defined as homes built between 1983 to 1987 with copper piping and lead solder and that self-identify as having a formula-fed infant under the age of 24 months. If a customer from a 1983 to 1987 home requests a water quality sampling kit, Denver Water will mail a kit whether or not a formula-fed infant resides at the property. If lead is measured above 3 µg/L, and the customer self-identifies as having a formula-fed infant, the customer is invited to enroll into the Filter Program. In the first six months of 2024, seven water quality sampling results were analyzed for select households, two of which identified as having a formula-fed infant. None of the households with formula-fed infants had lead measured above 3 µg/L and therefore were not enrolled in the Filter Program.<sup>20</sup>

### 5th L Sample Collection

During the Spring 2024 LCR compliance sampling round, technicians collected five 1 L sequential samples at 82 properties with an LSL included in the LCR study pool in preparation for new sampling protocols described in the EPA’s LCRR published in January 2021. Results are shown in Table 11. Lead was measured less than 1 µg/L in the 5th L at 24 properties, most of

<sup>18</sup> See Appendix CCT-3 Post LSL Replacement Sampling – Summary of Incomplete Offer to Test (Cumulative since Program Inception).

<sup>19</sup> CASS (Coding Accuracy Support System) is used by the United States Postal Service to verify and improve the accuracy of an address and its associated ZIP code.

<sup>20</sup> See Appendix CCT-4 Summary of Water Quality Sampling Results from Select Households (1983 to 1987 Homes, Cumulative since Program Inception).

which also measured less than 1 µg/L in the first draw. The results of Table 11 were compared to results described in the LRPP which included sampling using 10 sequential samples. In general, the 5th L profile sampling suggests the first draw (i.e., the compliance sample under the existing LCR) does not capture the highest lead concentrations within a service line. Four homes had concentrations greater than 15 µg/L in the fifth draw and there were no homes that had concentrations greater than 10 µg/L but less than 15 µg/L in the first draw. All results are an indication that the CCT component of the LRP is effective and CCT practices are expected to meet the needs of the LCRR when using a 5<sup>th</sup> L sampling collection protocol.

**TABLE 11. OVERVIEW OF 5<sup>TH</sup> LITER SAMPLING DATA IN SPRING 2024**

<b>5<sup>th</sup> L Sampling in 2024</b>	<b>Count</b>
<b>Total Number of Properties Sampled for 5<sup>th</sup> L</b>	82
<b>Number of Properties with inconclusive data (all liters &lt;1.0)</b>	24
<b>Number of Properties where the 5<sup>th</sup> L &lt; 1<sup>st</sup> L concentration</b>	20
<b>Number of Properties where the 5<sup>th</sup> L &gt; 1<sup>st</sup> L concentration</b>	62

## 7.B.ii LSL Inventory

Section 7.B.ii of the LCRR Variance requires that Denver Water maintain records and report the following information with respect to its LSL Inventory:

*ii. LSL Inventory.*

- a. In Order to meet the October 16, 2024, deadline in which the requirements for an initial inventory that complies with the LCRR must be met:*
- 1. total number of service lines;*
  - 2. the total number of replaced LSLs and GRR;*
  - 3. the total number of confirmed and likely LSLs;*
  - 4. the total number of unlikely LSLs;*
  - 5. the total number of non-LSLs, indicating the number designated as non-LSLs solely based on statistical factors;*
- b. the number of Investigations conducted each year, demonstrating that the cumulative average 1.4% verification rate has been met;*
- c. an updated service line inventory map; and*
- d. the rationale for a change in the status of a service line in the inventory (e.g., Investigation, replacement, water quality data).*

*Text is taken verbatim from the LCRR Variance, dated Nov. 30, 2022.*

Denver Water must comply with the terms and conditions of the Variance as well as all other provisions in the LCRR, including the requirements associated with CCT. Therefore, in addition to the efforts to fulfill Variance requirements, Denver Water is working to ensure compliance with the LCRR effective on Oct. 16, 2024, by refining the inventory to fit LCRR terminology and description. This section of this report further expands upon these efforts and the subsequent changes to the inventory.

An overview of the LSL Inventory reporting requirements is shown in Table 12.

**TABLE 12. OVERVIEW OF 7.B.II REQUIREMENTS**

Paragraph Reference	Description	Refer to
<b>3.A</b>	Continue to maintain on an ongoing basis an inventory of the material of each service line connected to the public water distribution system that is a confirmed or likely LSL. By October 16, 2024, Denver Water must have conducted an initial inventory that complies with the service line inventory requirements in 40 C.F.R. § 141.84(a).	Refer to Table 14.  In progress.
<b>3.C</b>	Continue to provide public access to its LSL inventory on its external customer website and update at least annually. By October 16, 2024, the inventory must list by specific street address which service lines are lead, galvanized requiring replacement, non-lead, or lead status unknown.	Re-posted on July 30, 2024, using data through June 30, 2024. In progress. <sup>1</sup>
<b>7.B.ii.a.1</b>	Total number of LSLs and GRR.	Refer to Table 14. See Appendix. <sup>2</sup>
<b>7.B.ii.a.2</b>	Total number of replaced LSLs during the LCRR Variance.	Refer to Table 15.
<b>7.B.ii.a.3</b>	Total number of confirmed and likely LSLs.	Refer to Table 14.
<b>7.B.ii.a.4</b>	Total number of unlikely LSLs.	Refer to Table 14.
<b>7.B.ii.a.5</b>	Total number of non-LSLs. Total number of non-LSLs determined solely by statistical methods.	Refer to Table 14. Described after to Table 14.
<b>7.B.ii.b</b> <b>3B, 3.D</b>	Number of investigations that support a determination of the material of the service line and that are performed independently of an LSL replacement or not at the request of the customer.	Refer to Table 21.
<b>LRPP III.B (p 51)</b>	Use results from investigations to update the predictive model which is used to plan and prioritize efforts of the COE Plan, ALSLR Program and Filter Program.	See Section 7.B.vii.
<b>7.B.ii.c</b>	Updated LSL Inventory Map.	<a href="https://www.denverwater.org/your-water/water-quality/lead">https://www.denverwater.org/your-water/water-quality/lead</a>
<b>7.B.ii.d</b>	Rationale for change to status of the service line in the LSL Inventory.	See Appendix. <sup>3</sup>

<sup>1</sup> Per discussions with EPA and CDPHE, the online map will include properties with a GRR status under confirmed lead in order to maintain clarity and continuity with customers.

<sup>2</sup> See Appendix INV-1 Summary of Service Line Status and p-Value (First Six-Month Period of 2024).

<sup>3</sup> See Appendices INV-2A Line by Line p-Value Changes: Status Descriptions and Notes (First Six-Month Period of 2024) and INV-2B Line by Line p-Value Changes by Status (First Six-Month Period of 2024).

### Current LSL Inventory [7.B.ii.a, b, c, and d]

The baseline LSL inventory was updated using additional information and further analysis of the data presented and submitted in the September 2019 LRPP (see Table 14). The initial LSL inventory designating known, suspected and possible LSLs was subsequently submitted Feb. 5, 2020.

Table 13 below details the terminology used for various submittals of the lead service line inventory under the LRP.

**TABLE 13. LEAD SERVICE LINE INVENTORY SUBMITTALS**

<b>Naming</b>	<b>Submittal Date</b>	<b>Notes</b>
<b>Baseline Inventory</b>	September 2019	Included in the Denver Water proposed Lead Reduction Program Plan (LRPP). <sup>1</sup> This inventory serves as the basis for the 63,955 LSL estimate and the 7% replacement rate.
<b>Initial Inventory</b>	February 2020	Provided an initial inventory within 35 days of the effective date of the 2019 LCR Variance, per paragraph 3.A. <sup>2</sup>
<b>Annual Inventory</b>	Yearly	Submitted along with each program year’s Annual Report and used in the application of the equivalency model to evaluate the performance of the LRP.
<b>LCRR Inventory</b>	October 2024	Note that the LCRR calls this an initial inventory but since Denver Water already has an initial inventory, this is specified as the LCRR inventory.

<sup>1</sup> Refer to the [September 2019 LRPP](#) for more information.

<sup>2</sup> Refer to the [LCR Variance](#) for more information.

Adjustments to service line designations to either the known lead or known non-lead categories are made based on available information from:

- Potholing (main-to-meter and meter-to-building).
- Interior inspections at the point of entry.
- Water quality sample results.
- Desktop review of existing Denver Water records.
- Predictive modeling.
- Customer submitted proof of replacement and City of Denver plumbing permits.
- Review of individual distributor records.

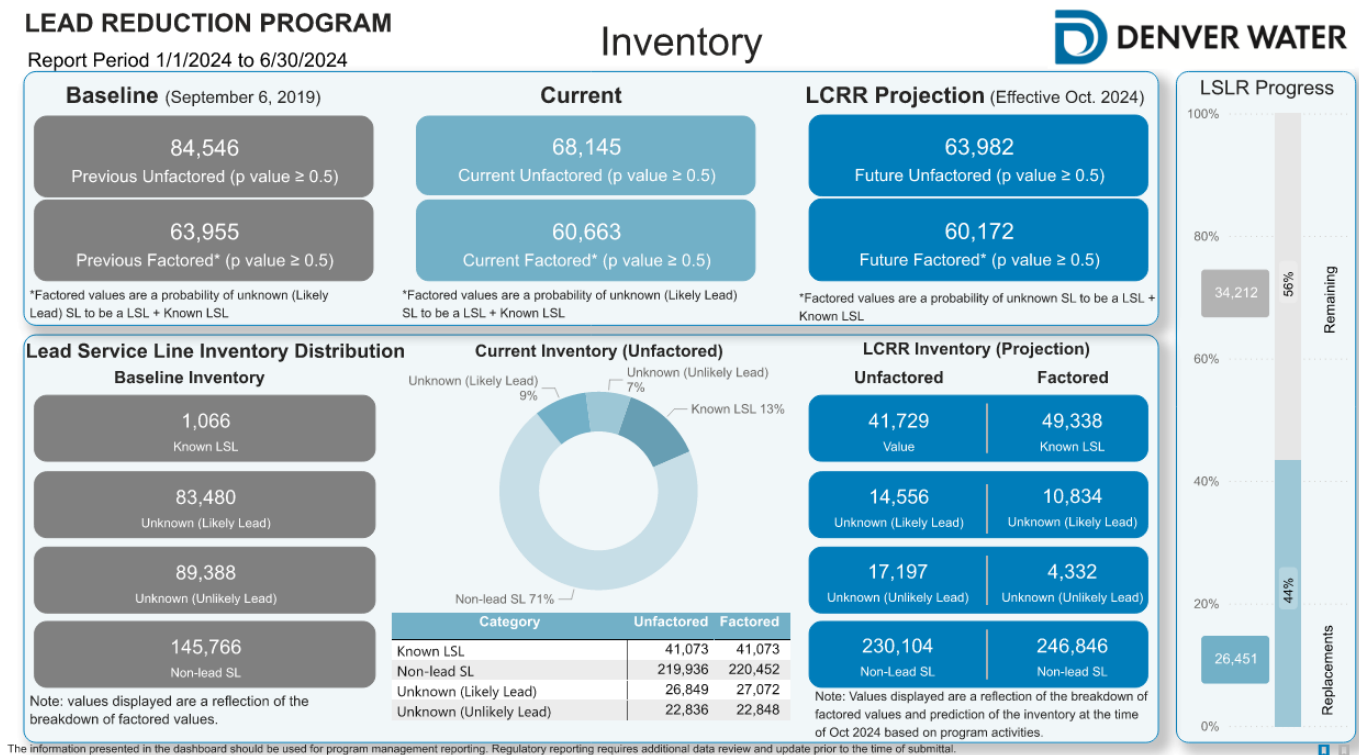
Service line reviews are an ongoing daily task of the program since 2020. Changes in the service line material designation are reflected in Denver Water’s online map, which is updated bimonthly.<sup>21</sup> Large changes to the inventory occurred in 2024 due to investigations and are described in the investigation section of this report. Beginning in October 2024, the program will shift to the terminology defined in the LCRR, grouping likely (possible and suspected LSL) and unlikely into unknowns.

Figure 3 below shows the inventory dashboard for the reporting period (Jan. 1 through June 30, 2024). The theme of the dashboard below is to demonstrate where the program started,

<sup>21</sup> See Denver Water’s [online map](#) for more information.

where it is today, and where it is anticipated to be as of Oct. 16, 2024. Key aspects of this dashboard include values identified as unfactored and factored. An unfactored value counts each record as an individual service line, regardless of p-value. A factored value sums the p-value of each service line such that three service lines with p-values of 0.5, 0.8, and 1 would count as 2.3 total lead service lines.

The baseline inventory, as described above, is the service line inventory submitted in September 2019 and is reflected in the left column of metrics. The current inventory column is the inventory as of June 30, 2024. The LCRR projection column is where the inventory is anticipated to be as of Oct. 16, 2024 (a reflection of the LCRR inventory submittal). The LSLR progress bar on the right side of the dashboard shows the number of lead service lines replaced since program inception (Jan. 1, 2020) and how many lead service lines Denver Water anticipates are remaining based on the factored value of the baseline inventory. Additional detail on the current lead service line inventory is further described in this section.



**FIGURE 3. INVENTORY DASHBOARD**

The information presented in Table 14 demonstrates the progress of Denver Water's understanding of the current lead service line inventory compared with the baseline inventory submitted in September 2019. The inventory is used to establish the total number of estimated lead services and the mandated annual number of replacements. For the purposes of Table 14, the total number of confirmed LSLs includes the number of properties with a known lead service that remain in the ground and those that have been replaced by the LRP.

The LCRR defines galvanized requiring replacement (GRR) as any service line where either:

- 1) A portion of the line is galvanized, and that segment is or was at any time, downstream of a lead service line; or
- 2) The galvanized service line is currently downstream of an unknown service line.

Currently, Denver Water does not have a clearly defined method to prove that lead was never upstream of the galvanized section and would not require replacement. Therefore, Denver Water replaces all galvanized service lines found as a precaution. Since Denver Water categorizes any service line where lead is identified as an LSL, regardless of other materials being identified, this classification encompasses GRR service lines where galvanized was confirmed downstream of lead. Therefore in 2024, as shown in Table 14, the program has confirmed 35,626 LSLs with an additional subset of 5,447 GRR service lines. It is important to note that a substantial number of these properties identified lead between the main and meter and galvanized between the meter and home. The additional 5,447 service lines classified as GRR in Table 14 represent those galvanized service lines where lead was not found. Ongoing investigations have shown that 5,219 of these properties have found copper upstream of the galvanized section. Denver Water continues to explore these properties through record review, water quality sampling, potholing and interior inspections to identify trends in the installation practices from the era when galvanized was installed.



**TABLE 14. LEAD SERVICE LINE INVENTORY AS OF JUNE 30, 2024**

Status of Service Line	Sept. 6, 2019 Submittal (Aug. 8, 2019 Data)	Feb. 5, 2020 Submittal (Jan. 28, 2020 Data)	Feb. 9, 2024 Submittal (Dec. 31, 2023 Data)	Aug. 9, 2024 Submittal (June 30, 2024 Data)
	BASELINE INVENTORY	INITIAL INVENTORY	2023 ANNUAL REPORT	CURRENT INVENTORY <sup>1</sup>
<b>Confirmed LSL<sup>2</sup></b> <i>(previously referred to as Known Lead)</i>	1,066	1,149	32,864	35,626
<b>GRR<sup>3</sup></b>	<i>(Included with Confirmed LSL count)</i>		4,054	5,447
<b>Likely LSL</b> <i>(Suspected Lead + Possible Lead)</i>	83,480	82,337	34,964	27,072
<b>Unlikely LSL</b>	89,388	90,745	31,579	22,848
<b>Non-LSL<sup>4,5</sup></b>	145,766	146,528	217,292	220,452
<b>Total Number of Services</b>	319,700	320,759	320,753	311,445
<b>TOTAL ESTIMATED Number of Lead Service Lines<sup>6,7</sup></b>	<b>63,955</b>	<b>63,195</b>	<b>62,114</b>	<b>60,663</b>

- <sup>1</sup> The “current inventory” is the basis of enrollment in the Filter Program (calculated as the sum of the properties with a confirmed or likely LSL, plus distribution of additional filters to multiple units at the same property and less the number of vacant properties).
- <sup>2</sup> Since the 2020 Annual Report, the current inventory counts for “known lead” include properties that are either known to be lead, GRR, or that have had a lead or galvanized service line replaced. The 26,391 properties categorized as “confirmed LSL” in the current inventory were replaced since program inception (see Table 15 and Table 24). Due to ongoing data integration and QC processes, 217 of the 26,691 properties identified as confirmed replacements remain to be integrated into the LRP database to drive a p-value change to 0. Of these 217, one remains as “unlikely LSL”, 65 as “likely LSL”, 60 as “confirmed LSL”, and an additional 91 are described as non-active or non-potable (coded as NULL). The counts for these categories in the current inventory (most right column) have been reduced accordingly.
- <sup>3</sup> Previous inventory reporting counted GRRs under the “confirmed LSL” count. GRRs in the June 30, 2024, LSLI include galvanized-galvanized (106 properties), copper-galvanized (5,219 properties), and galvanized-copper (149 properties) service lines. Properties with galvanized (and no lead identified in potholing) with water quality results  $\geq 3$   $\mu\text{g/L}$  lead are included in this number.
- <sup>4</sup> The “non-LSL” count currently does not include properties where galvanized was identified but did not require replacement (lead was never upstream of the galvanized service line). Denver Water plans to assess their processes in 2024 for galvanized service lines to identify which galvanized service lines require replacement.
- <sup>5</sup> Since the 2020 Annual Report, the counts for “non-LSL” do not include the properties at which the LSL was replaced as part of the LRP (see Table 15), as these are already included in the count for “confirmed LSL.”
- <sup>6</sup> See Appendix INV-6 Summary of Service Line Status and p-Value (Second Six Month Period of 2023) for details on how this was calculated.
- <sup>7</sup> In 2024, 15,357 Consolidated Mutual properties were removed from the inventory and an additional 6,940 new records representing new properties were added to the inventory.

Of the 220,452 service lines identified as non-lead in the current inventory, 197,106 are included in this category based solely on statistical assumptions (140,600 from the initial Sept. 6, 2019, inventory, 5,212 since identified through desktop evaluation and 51,294 based on recommendations from the predictive model). The material of these service lines was not confirmed via field observations; rather, the service line was classified as non-lead based on the age of the building, history of development in the Denver Water service area, operating rules

requiring copper at post-1971 properties, water main tap date, etc.<sup>22</sup> Properties built or connected between 1951 and 1971 are considered unlikely LSLs based on historical records and evidence of non-lead materials.<sup>23</sup> Denver Water continues to review investigation data on these service lines in an effort to further classify the materials of these service lines.

### Number of LSL Replacements Completed and Incorporated into the Inventory [7.B.ii.d]

The total number of LSLs replaced between Jan. 1 and June 30, 2024, is shown in Table 15. Denver Water does not count the replacement of known copper service lines (i.e., non-LSLs) toward the total number of LSL replacements for compliance purposes.<sup>24</sup>

**TABLE 15. NUMBER OF LSL REPLACEMENTS BETWEEN JAN. 1 AND JUNE 30, 2024**

Description	Count <sup>1</sup>
Number of LSLs Replaced in January 2024	422
Number of LSLs Replaced in February 2024	604
Number of LSLs Replaced in March 2024	589
Number of LSLs Replaced in April 2024	730
Number of LSLs Replaced in May 2024	746
Number of LSLs Replaced in June 2024	898
<b>Total Number of LSLs Replaced in the First Six Months of 2024</b>	<b>3,989</b>
Number of LSLs Replaced not Previously Reported <sup>2</sup>	56
<b>Total Number of LSLs Replaced since inception of LRP on Jan. 1, 2020</b>	<b>26,451</b>

<sup>1</sup> The number of replacements identified in the “Lead Replacement” column of Appendix INV-2B (Line by Line p-Value Changes by Status, First Six-Month Period of 2024) does not match the number of lead service line replacements shown in Table 15 due to a lag in the quality assurance review during data integration from field replacements to LRP database.

<sup>2</sup> This includes the net change to the number of LSL replacements completed since program inception not previously reported (57 added) and previously reported LSL replacements that upon review were removed (1 deduction); see Appendix LSL-4 Addresses and Types of Replacements for Properties Not Previously Counted and Duplicates (Since Program Inception) for details.

### Investigations of Service Line Material [7.B.ii.b]

Section 3.D of the LCRR Variance requires that “Denver Water . . . [i]nvestigate a cumulative average of 1.4% of the total estimated number of unknown service lines in the inventory each Program Year. . . .”

As required by the LCRR Variance, Denver Water continues to conduct investigations of service lines and make refinements to the LSL Inventory of service line materials connected to

<sup>22</sup> This is the number which retains the original number of non-lead properties (p-value = 0) from the inventory in the Lead Reduction Program Plan (see Appendix III.B.2, Preliminary Identification of Lead Service Lines).

<sup>23</sup> See Appendix II.B.2 of the Lead Reduction Program Plan for details and assumptions.

<sup>24</sup> See paragraph 4.B of the LCRR Variance and the notes for the column “Actual Previous Materials” in Appendix LSL-1 Addresses and Types of Replacements (First Six-Month Period of 2024).

its water system. Investigations are performed at properties to improve the assumptions that were used to develop the LSL Inventory.<sup>25</sup>

Investigations are counted by investigation type and may include desktop evaluation of available data from Denver Water, assessors, permits, distributors and customers; water quality sampling; potholing; predictive model; and/or interior inspection. After 15 years of the LRP, there should be no remaining properties in the LSL Inventory categorized as likely LSL and all confirmed LSLs should be replaced.

Figure 4 below details the process flow for the investigation methods used under the LRP and how each method is used to identify material type, removing a property from the unknown category into the known (lead or non-lead) category. All data gathered from water quality sampling, potholing, interior inspections and desktop reviews are used to train the predictive model. The predictive model is discussed in further detail later in this section.<sup>26</sup>

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<sup>25</sup> See Denver Water's [Investigations Webpage](#) and the [LCRR Variance](#) for more information.

<sup>26</sup> For additional information on the predictive model, see Appendix INV-10 Predictive Model Technical Memorandum from the 2023 Annual Report.

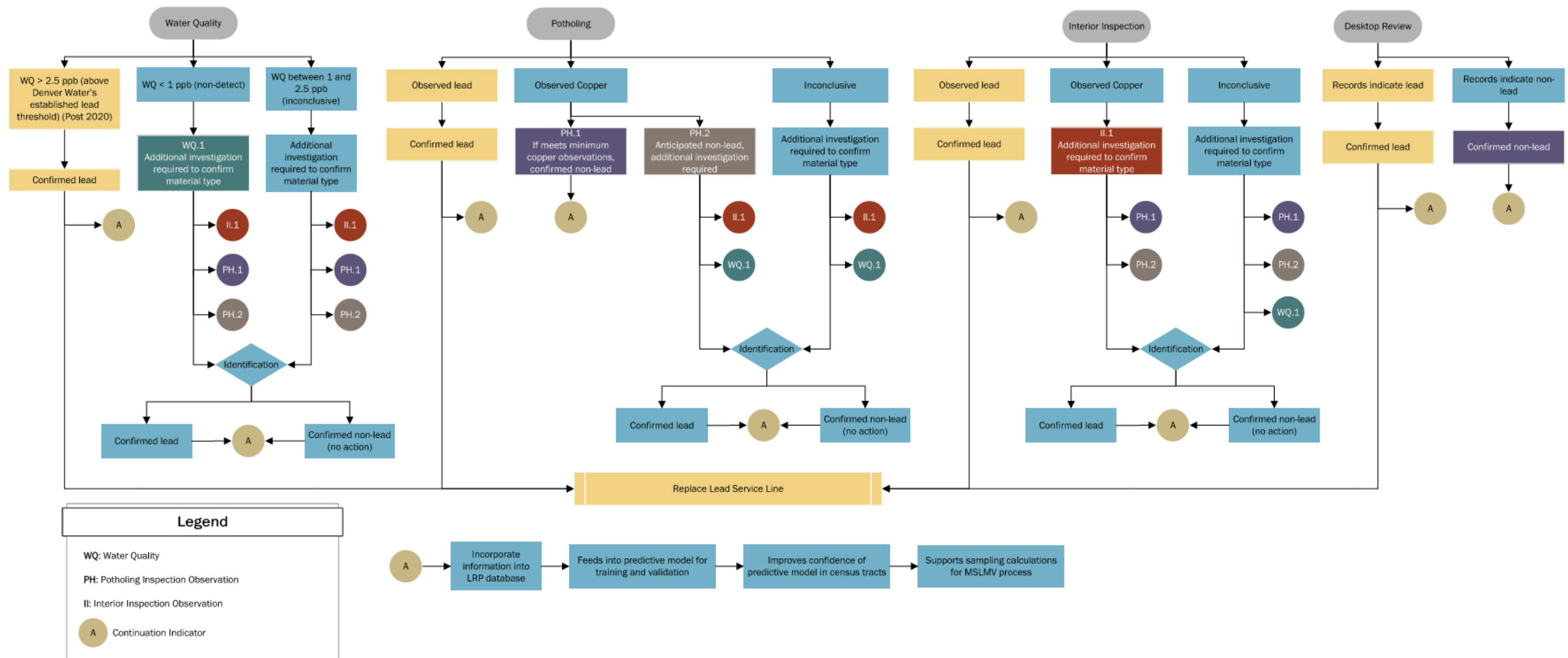


FIGURE 4. INVESTIGATION FLOW DIAGRAM

A property can be counted toward an investigation up to five times (one time per category, described later in this section) over the duration of the program. An investigation does not need to result in a p-value change, unless the method is predictive modeling.

An investigation is counted if all the following conditions apply:

- 1) The property is originally classified as unknown (see paragraphs 3.B and 3.D in the LCRR Variance).
- 2) The investigation was performed independently of LSL replacements (see paragraph 3.D in the LCRR Variance). Visual verifications that result in a copper material designation, and therefore do not result in a replacement, are counted as an investigation. If Denver Water includes an investigation in the semi-annual report and later replaces said LSL even though it was not originally planned, that investigation will still count toward the 1.4% metric and will not be removed from the investigation metric total.
- 3) The investigation was not the result of a customer-requested water quality sample (see paragraph 1.L in the LCRR Variance).

**Definitions used to categorize the service line material:<sup>27</sup>**

Confirmed LSL	based upon direct evidence that gives a 100% estimated probability per the LRPP that a service line is an LSL or a “galvanized requiring replacement” service line.
Likely LSL	based upon available data that provides an estimated probability value between 50 to 99% that a service line is an LSL or a “galvanized requiring replacement” service line.
Unlikely LSL	based on conflicting or missing data that provides an estimated probability value between 1% to 49% that a service line is an LSL based on the LRPP; or a “galvanized requiring replacement” service line.
Non-Lead	0% likelihood of finding lead.

The number of investigations to support a determination of the service line material are counted toward the required 1.4% of the unknowns in the LSL Inventory investigated each year. An unknown service line is defined as any service line that does not have a p-value of 0 (non-lead) or 1 (known lead). Denver Water considers five types of investigations that can be performed on service lines:

- 1) Interior inspections.
- 2) Potholing.
- 3) Water quality sampling.
- 4) Desktop reviews.
- 5) Predictive modeling.

The Figure 5 dashboard below shows the number of investigations counted year-to-date (Jan. 1, 2024, through June 30, 2024) and program-to-date (Jan. 1, 2020, through June 30,

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<sup>27</sup> As defined in paragraphs 1.C, 1.P, and 1.X of the LCRR Variance, dated Nov. 30, 2022, for confirmed LSL, likely LSL, and unlikely LSL, respectively. Note that the definition of non-lead was not provided in the LCRR Variance.

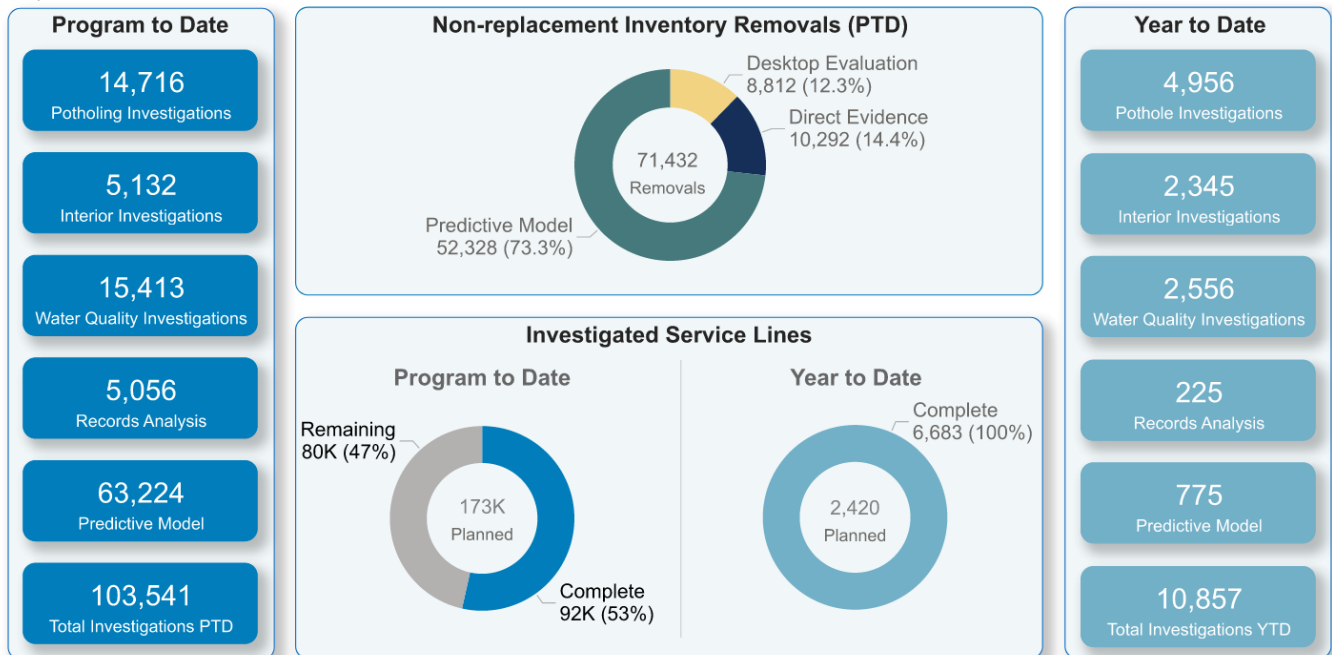
2024). The purpose of the dashboard is to exhibit the types and sum of investigations conducted to date and the sum of service lines investigated so far in 2024. It is important to note that the investigations metric and investigated service lines are accounted for differently. Investigations can be one of the five categories listed above, and a single service line can have up to five different types of investigations. Investigated service lines, however, represents the number of individual service lines that had at least one investigation conducted. A service line that has been investigated via more than one method will only be counted once under this metric. For example, if a property had a water quality test and potholing, the efforts would count as two investigations and one investigated service line. Investigated service lines are what is used to calculate the annual metric under the Variance. Further detail on investigations conducted in this reporting period (Jan. 1 through June 30, 2024) is provided throughout this section of the report.

**LEAD REDUCTION PROGRAM**

Report Period 1/1/2024 to 6/30/2024



**Investigations**



The information presented in the dashboard should be used for program management reporting. Regulatory reporting requires additional data review and update prior to the time of submittal.

**FIGURE 5. INVESTIGATIONS DASHBOARD**

**SERVICE LINE IDENTIFICATION PROCESS**

CDPHE published a Service Line Identification (SLID) Policy on Sept. 7, 2023, which provided a process for establishing an initial lead service line inventory and identifying unknowns in preparation for the LCRR. For a decade, Denver Water has worked on the lead service line inventory and has taken steps to achieve a completed inventory, which align with Steps 1 through 3 of the SLID Policy. The LRP does, however, have some practices that may differ from Step 4 of the SLID Policy for identifying unknowns and instead goes above and beyond what is required, as detailed within this section.

Predictive modeling was incorporated into the LRP as an investigative method in the spring of 2023. The predictive model has been a part of the LRP since inception but was historically not used to change lead service line inventory p-values until early 2023 as model performance and confidence in predictive model output increased. With the large number of unknowns in Denver Water's service area, the predictive model refines the inventory (i.e., identify unknown materials) by using machine learning, as discussed later in this section. Denver Water began incorporating the predictive model into the inventory, implementing large scale p-value changes. These p-value changes due to the predictive model are counted toward Denver Water's investigation metric defined by the LCRR Variance, as well as investigations that occurred within replacement work areas that resulted in a confirmed non-lead service line (and therefore were not replaced as part of the ALSLR Program). CDPHE's SLID Policy published September 2023 defines a minimum service line material verification (MSLMV) process, or a multi-source analysis, that takes a combination of methods (interior inspections, potholing, water quality, desktop reviews and predictive modeling) and uses the results to determine a service line material. The large uptick in investigations seen in 2023 and 2024 are due to this shift in investigation perspective and are summarized at the end of this section.

#### INTERIOR INSPECTIONS

Interior inspections provide Denver Water field crews with a visual observation of the service line as it enters the premise (Point of Entry). This helps the field crew confirm the material that was observed at the meter to building pothole. There are, however, limitations to interior inspections, and at times observing the service line entering the building is not possible due to obstructions or lack of consent from the homeowner. Interior inspections alone are not sufficient for non-lead material designation and must be considered in conjunction with other types of investigations. Table 16 below details the interior inspections conducted during the reporting period.

**TABLE 16. INTERIOR INSPECTION OBSERVATIONS (JAN. 1 TO JUNE 30, 2024)**

Service Line Status	Total Number of Investigations <sup>1</sup>	Interior Inspection Observation	Follow up Action
<b>Initial Status</b> <b>0.5 ≤ p ≤ 0.9</b>	1,432	Observed lead	Property added to list for LSL replacement and is scheduled to be replaced.
	3,434	Observed non-lead	Additional investigation is required.
	543	Incomplete	Additional investigation is required.
<b>Initial Status</b> <b>0.01 ≤ p &lt; 0.5</b>	4	Observed lead	Property added to list for LSL replacement and is scheduled to be replaced.
	9	Observed non-lead	Additional investigation is required.
	3	Incomplete	Additional investigation is required.
<b>Total Number of Interior Inspections (First Six Months Only)<sup>2</sup></b>			<b>5,512</b>

<sup>1</sup> Includes 21 interior inspections conducted outside of the ALSLR Plan for investigative purposes.

<sup>2</sup> Includes 87 properties not included in above categories. Of the 87, 42 properties with a February 2020 p-value of 1, 41 properties with a February 2020 p-value of 0, and 4 properties added to the inventory after the February 2020 submittal where an interior inspection was conducted for investigative purposes.

In an effort to increase the number of interior investigations performed under the LRP, Denver Water is launching a customer self-reporting tool. The tool, which will be accessible to all Denver Water customers, will guide the customer through the process of locating and identifying the material of their service line at the building point of entry. Data entries submitted by the customer will undergo review by LRP staff to compare the identified material with photos submitted by the customer. Submissions that are validated by the review process will be incorporated into the lead service line inventory.

**POTHOLING**

Potholing can be used to identify lead status as a stand-alone investigative method or can be used in combination with other investigative methods to designate a property as non-lead. To confirm non-lead, there can be no lead or galvanized visually observed from potholing and interior inspections and there can be no contradictions with the desktop records review and/or water quality sampling results.

Verification potholing is used at properties included in the 2024 ALSLR Plan to confirm the material of the service line before replacement to help further develop the inventory. As of Aug. 10, 2020, all likely LSLs ( $0.5 \leq p\text{-value} < 1$ ) are verified prior to replacement, with potholing and/or water quality sampling, to reduce the likelihood of replacing a non-LSL.

Visual observations are conducted to observe the material type of the service line using potholing and interior inspections. Results from potholing as part of the ALSLR Program are presented in Table 17 along with the next steps to either replace a service line that is confirmed to be lead or to pursue additional investigative methods. If copper is observed at three or more points used for verification (e.g., copper is observed at two exterior potholes and at the interior connection), the service line is not categorized and the p-value is not adjusted; rather, the property is subjected to additional investigation efforts (i.e., interior inspections, additional potholing, water quality sampling, desktop review) to identify the service line material. To confirm



non-lead, there must be no signs of lead or galvanized pipe material visually observed when potholing activities are conducted.

**TABLE 17. POTHOLING OBSERVATIONS AS PART OF THE 2024 ALSLR PLAN (JAN. 1 TO JUNE 30, 2024)**

Service Line Status	Total Number of Investigations	Pothole Observation	Follow up Action
<b>Initial Status <math>0.5 \leq p \leq 0.9</math></b>	3,265	Confirmed lead.	Property added to list for LSL replacement and is scheduled to be replaced.
	1,259	Confirmed non-lead.	Remove property from LRP.
	1,654	Incomplete.	Additional investigation is required.
<b>Initial Status <math>0.01 \leq p &lt; 0.5</math></b>	4	Confirmed lead.	Property added to list for LSL replacement and is scheduled to be replaced.
	0	Confirmed non-lead.	Remove property from LRP.
	10	Incomplete.	Additional investigation is required.
<b>Total Number of Properties Potholed within 2024 ALSLR Program (First Six Months Only)<sup>1</sup></b>			<b>6,304</b>

<sup>1</sup> Includes 112 properties not included in above categories. Of the 112, 39 properties with a February 2020 p-value of 1, 66 properties with a February 2020 p-value of 0, and 7 properties added to the inventory after the February 2020 submittal.

During the first six months of 2024, potholing was performed at 1,413 properties not included in the 2024 ALSLR Plan.<sup>28</sup> Results are included in Table 18. If potholing occurred at a critical customer property and lead is found, the property is scheduled for replacement in 2024 and thus does not contribute to the required number of annual investigations.

<sup>28</sup> See Appendix INV-3 Results from Visual Verifications (First Six-Month Period of 2024).

**TABLE 18. POTHOLING OBSERVATIONS INDEPENDENT OF THE 2024 ALSLR PLAN (JAN. 1 TO JUNE 30, 2024)**

Service Line Status	Total Number of Investigations <sup>1</sup>	Pothole Observations	Follow up Action
<b>Initial Status</b> <b>0.5 ≤ p ≤ 0.9</b>	640	Confirmed lead.	Property added to list for LSL replacement and is scheduled to be replaced.
	117	Confirmed non-lead.	Remove property from LRP.
	488	Incomplete.	Additional investigation is required.
<b>Initial Status<sup>1</sup></b> <b>0.01 ≤ p &lt; 0.5</b>	28	Confirmed lead.	Property added to list for LSL replacement and is scheduled to be replaced.
	2	Confirmed non-lead.	Remove property from LRP.
	126	Incomplete.	Additional investigation is required.
<b>Total Number of Properties Potholed Independent of the 2024 ALSLR Program (First Six Months Only)<sup>2</sup></b>			<b>1,413</b>

<sup>1</sup> This includes critical customers that were originally assigned a p-value < 0.5. One critical customer under this category was potholed in the first six months of 2024.

<sup>2</sup> Includes 12 additional properties not included in above categories. Of the 12, 11 properties with a February 2020 p-value of 0, and one property added to the inventory after the February 2020 submittal.

Currently, when galvanized service line material is observed, Denver Water makes the conservative assumption that the galvanized pipe was/is downstream of an LSL and therefore replaces the service line. To prepare for upcoming regulations regarding GRRs under the LCRR, Denver Water continues to investigate the service line, regardless of galvanized material being found, to gather as much information as possible on the property. Denver Water has discovered multiple circumstances where copper is identified upstream of galvanized and water quality sampling results are non-detect. Understanding the characteristics and trends of GRRs in Denver Water’s service area will help the predictive model improve its confidence and may allow Denver Water to avoid replacing all galvanized encountered if it is possible to prove the galvanized service line was never downstream of lead.

**WATER QUALITY**

Results from water quality sampling can provide an indication of lead at single-family residential properties, and the status of a service line can be changed in the inventory (i.e., from unknown to confirmed lead). The three-bottle tests are performed to aid in the classification of service line materials of properties within Denver Water’s integrated service area. This sampling process not only provides insight into the material profile of the service line, but also aids in the categorization of material through supporting investigations including the predictive model.

Water quality sampling alone can be successful at locating individual LSLs, but the LRP extends beyond this and looks at opportunities where water quality coupled with predictive model-reinforced learning provides guidance for larger scale lead service line inventory adjustments of unlikely LSLs to known non-lead.

Results for water quality sampling at properties included in the 2024 ALSLR Plan are presented in Table 19 (i.e., verification pre-LSL replacement sampling) and results from properties not included in the 2024 ALSLR Plan are presented in Table 20 (i.e., investigative

sampling).<sup>29</sup> As of Feb. 25, 2021, results from water quality sampling are assessed against a reduced threshold concentration used to indicate lead in pre-LSL replacement samples. A lower threshold was selected as a result of lower lead levels achieved when pH is consistently maintained at  $8.8 \pm 0.3$  across the distribution system. This means that any sample collected on or after May 1, 2020, with lead measured at or above 3 µg/L in the second or third bottle of the three-bottle test is considered conclusive for an LSL. Lead measured below this threshold at properties with an initial status of likely LSL (i.e., p-value  $\geq 0.5$ ) is inconclusive for non-lead and additional investigations or review of data are needed to determine the status of the service line material. Lead measured below this threshold at properties with an initial status of unlikely lead (i.e., p-value  $< 0.5$ ) is considered conclusive for non-lead and no additional investigations are undertaken and the property is not added to the LRP. Finally, lead measured below the detection limit of 1 µg/L is also considered indicative of non-lead only when copper is visually observed at three or more points. In summary, whereas water quality sampling at or above 3 µg/L is conclusive for lead, additional steps are taken to confirm non-lead and the p-value is not reduced to 0 based on water quality results alone.

**TABLE 19. OBSERVATIONS FROM WATER QUALITY INVESTIGATIONS AS PART OF THE 2024 ALSLR PLAN (JAN. 1 TO JUNE 30, 2024)**

Service Line Status	Total Number of Investigations <sup>1</sup>	Water Quality Observations	Follow up Action
<b>Initial Status <math>0.5 \leq p \leq 0.9</math></b>	384	Confirmed lead. <sup>2</sup>	Property added to list for LSL replacement and is scheduled to be replaced.
	654	Non-detect. <sup>3</sup>	Additional investigation is required.
	276	Inconclusive. <sup>4</sup>	Additional investigation is required.
<b>Initial Status <math>0.01 \leq p &lt; 0.5</math></b>	0	Confirmed lead. <sup>2</sup>	Property added to list for LSL replacement and is scheduled to be replaced.
	12	Non-detect. <sup>3</sup>	Additional investigation is required.
	0	Inconclusive. <sup>4</sup>	Additional investigation is required.
<b>Total Number of Water Quality Samples within 2024 ALSLR Program (First Six Months Only)<sup>5,6</sup></b>			<b>1,340</b>

<sup>1</sup> Excludes customer requested sample results. These samples were collected at properties included in the 2024 ALSLR Plan (and therefore do not count toward the required 1.4% investigations).

<sup>2</sup> Lead measured  $\geq 3$  µg/L in the second or third sample bottle from the three-bottle test.

<sup>3</sup> Lead measured  $< 1$  µg/L in the second and third sample bottle from the three-bottle test.

<sup>4</sup> All other tests where lead measured  $< 3$  µg/L in the second and third sample bottle from the three-bottle test.

<sup>5</sup> Includes 13 additional properties, not included in the above categories, with an initial p-value of 0.

<sup>6</sup> Includes 1 additional property, not included in the above categories, with an initial p-value of 1.

<sup>29</sup> See Appendix INV-4 Water Quality Sampling (First Six-Month Period of 2024).

**TABLE 20. OBSERVATIONS FROM WATER QUALITY INVESTIGATIONS INDEPENDENT OF THE 2024 ALSLR PLAN (JAN. 1 TO JUNE 30, 2024)**

Service Line Status	Total Number of Investigations <sup>1</sup>	Water Quality Observations	Follow up Action
<b>Initial Status</b> <b>0.5 ≤ p ≤ 0.9</b>	199	Confirmed lead. <sup>2</sup>	Property added to list for LSL replacement and is scheduled to be replaced.
	251	Non-detect. <sup>3</sup>	Additional investigation is required.
	146	Inconclusive. <sup>4</sup>	Additional investigation is required.
<b>Initial Status</b> <b>0.01 ≤ p &lt; 0.5</b>	12	Confirmed lead. <sup>2</sup>	Property added to list for LSL replacement and is scheduled to be replaced.
	816	Non-detect. <sup>3</sup>	Additional investigation is required.
	18	Inconclusive. <sup>4</sup>	Additional investigation is required.
<b>Total Number of Water Quality Samples Independent of 2024 ALSLR Program (First Six Months Only)<sup>5,6</sup></b>			<b>1,458</b>

<sup>1</sup> Excludes customer requested sample results. These samples were collected at properties independent of the 2024 ALSLR Plan and therefore do count toward the required 1.4% investigations, if the conditions that define an investigation are met.

<sup>2</sup> Lead measured ≥ 3 µg/L in the second or third sample bottle from the three-bottle test.

<sup>3</sup> Lead measured < 1 µg/L in the second and third sample bottle from the three-bottle test.

<sup>4</sup> All other tests where lead measured < 3 µg/L in the second and third sample bottle from the three-bottle test.

<sup>5</sup> Includes 16 additional properties, not included in the above categories, with an initial p-value of 0.

<sup>6</sup> Includes 1 additional properties, not included in the above categories, with an initial p-value of 1.

**DESKTOP REVIEWS**

The desktop review process consists of a review of existing documentation pertaining to a specific property and its service line. Typically, the purpose of the review is to determine if there is sufficient supporting evidence to indicate if a service line is non-lead, commonly due to an LSL replacement conducted pre-2020 prior to implementation of the LRP. A desktop review is used to collect, organize and combine available data for a given property using methodologies that do not require a field investigation.

The supporting evidence used in a desktop review varies, as does the information available for each individual property. Generally, supporting evidence consists of construction and plumbing permits, Denver Water work orders, customer-submitted proof of replacement or other field notes. Records indicating a partial service line replacement require additional verification, either through desktop or field investigation, to confirm that the entire service line is non-lead following the partial replacement. In the first six-month period of 2024, desktop reviews were conducted on 225 properties.

**PREDICTIVE MODEL**

The predictive model advances the decision logic developed for the lead service line inventory by associating known service line material derived through pothole or water quality field data with property characteristics such as location, build date, tap year, property type and value, income, and many other factors. The model generates a probability of lead or non-lead for properties with unknown service line material using these observable property characteristics.

The program has met the target accuracy and the other key performance metrics that are suitable for the use and application of the model as described in the application section of the Predictive Model Technical Memorandum.<sup>30</sup> Performance metrics cited in the memorandum represent global performance (i.e., considering validation data set aside from the entire Denver Water service area together). More granular performance at the census tract level is then assessed to identify areas within the service area where the model predictions are reliable, or where further training or investigation is indicated. Specifically, the 95% confidence bounds of metrics such as positive and negative predictive value, and positive and negative likelihood ratios are considered in model assessment.

While the model's global false negative rate (where lead services are misidentified as non-lead) is low, it is important to acknowledge that this misclassification is significant from a human health perspective and cannot be eliminated using the model alone. For this reason, model performance is evaluated at the census tract level and checked against the validation data as described in Section 2.4.2.b of the CDPHE SLID Policy specific to the minimum service line validation process. Where the model performance does not meet benchmarks or the sampling results did not validate the material, model predictions are not used in decision-making. Rather, the data captured is used for additional model training and further sampling requirements are identified. The process is repeated until the necessary requirements for the validation process and performance metrics are met or exceeded for the specific census tract.

Prior to 2023, the predictive model was used to prioritize enrollment in the Filter Program, prioritize replacement of LSLs and focus investigations for uncertainty in the model coupled alongside disproportionately impacted areas to improve model performance. Beginning in 2023, the predictive model has been used as a component of a multi-source analysis (including historical records, model predictions and randomized statistical sampling) to designate service line materials (i.e., make p-value changes) to the lead service line inventory, thus removing unknowns in preparation for the LCRR inventory due date.

The predictive model is used to confirm the service line material designation when there is agreement with the lead service line inventory material designation at a property and provides opportunities to better understand material designations when there is less certainty or disagreement with a lead service line inventory material designation by identifying needed investigations or multi-source analysis.

The properties evaluated for p-value changes using the predictive model in 2024 were grouped by census tracts and evaluated for areas that met or exceeded a target negative or positive predictive metric threshold 95% confidence bound, while also considering census tract prevalence of lead and verification sampling of unknowns.<sup>31</sup> After a review of validation data against material recommendations and ensuring there are no conflicting data for the material

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<sup>30</sup> See Appendix LSL-11 Predictive Model Technical Memorandum from the 2023 Annual Report.

<sup>31</sup> For detailed explanations of predictive modelling terms such as "negative predictive value" and "confidence", see Appendix LSL-11 Predictive Model Technical Memorandum from the 2023 Annual Report.

designation change to lead or non-lead through the multi-source analysis approach, this evaluation led to 777 material designation changes to known non-lead and no material designation changes to known lead in the first six months of 2024.

Properties that do not yet meet the criteria defined above are evaluated for additional investigation opportunity to further improve model performance prior to making service line material change recommendations. Service lines intended to be investigated within the census tract are selected through a spatially balanced randomized sampling process and include additional properties that achieve opportunistic sample capturing based on contractor mobilization to achieve adequate and efficient sampling. The additional properties aim to achieve adequate sampling results to measure performance of the properties in the entire recommended group. While water quality sampling alone cannot be used to determine non-lead services, the combination of randomized water quality sampling and the predictive model, which integrates MSLMV sampling from throughout the service area to identify service line materials based on property characteristics, provides verifiable performance in a manner comparable to that outlined in Section 2.4.2.b of the CDPHE SLID Policy.

SUMMARY

The efforts involved in the five methods of investigation described above are summarized below in Table 21 for 2024.

**TABLE 21. NUMBER OF INVESTIGATIONS PERFORMED TO DETERMINE THE MATERIAL OF THE SERVICE LINE (JAN. 1 AND JUNE 30, 2024)**

	Count
Number of Potholing Investigations	4,956
Number of Interior Inspections	2,345
Number of Water Quality Samples	2,556
Number of Desktop Investigations	225
Number of Predictive Model Investigations	775
<b>Total Number of Investigations Completed in the First Six Months of 2024</b>	10,857
<b>Number of Investigations Not Previously Reported in 2023<sup>1</sup></b>	198

<sup>1</sup>Includes 8 pothole investigation, 4 interior inspections, 161 water quality investigations and 8 predictive model investigations and 17 desktop evaluations that were not included in the annual report.

Table 22 calculates the unknown service lines investigated for 2024 and the cumulative annual average percent since program inception. Per the LCRR Variance, Denver Water must investigate a cumulative annual average of 1.4% of all unknowns (likely and unlikely LSLs) based on the September 2019 baseline lead service line inventory.

**TABLE 22. YEAR OVER YEAR COMPARISON OF UNKNOWN SERVICE LINES INVESTIGATED**

	2020	2021	2022	2023	2024
<b>Annual Unknown Service Lines Investigated</b>					
<b>Annual Regulatory Target</b>	1,169	1,169	1,169	2,420	2,420
<b>Total Number of Unknown Service Lines Investigated</b>	3,326	4,562	4,918	71,776	6,683
<b>Number of Service Lines Investigations Reported after Submission of the Annual Report<sup>1</sup></b>	2,034	0	- 825	171	198
<b>Cumulative Unknown Service Lines Investigated</b>					
<b>Cumulative Unknown Service Lines Investigated<sup>2</sup></b>	5,360	9,922	14,015	85,962	TBD <sup>4</sup>
<b>Cumulative Annual Average of Unknown Service Lines Investigated</b>	5,360	4,961	4,672	21,490	TBD <sup>4</sup>
<b>Cumulative Annual Average Percent of Unknown Service Lines Investigated<sup>3</sup></b>	3.1%	2.9%	2.7%	12.4%	TBD <sup>4</sup>

<sup>1</sup> Investigations not previously reported occurred at properties confirmed after the data cut-off used to prepare the annual reports. Includes properties removed from the investigation counts due to replacements occurring later in the same program year.

<sup>2</sup> This number represents the distinct number of service lines investigated since program inception. If a property was counted in a previous year for one type of investigation and then in the current year as another type of investigation, it would only be counted once in the cumulative unknown service lines investigated.

<sup>3</sup> Per the LCRR Variance, Denver Water must investigate a cumulative annual average of 1.4% of all unlikely and likely LSLs (unknowns) from the September 2019 inventory (172,868).

<sup>4</sup> To be calculated in the 2024 Annual Report.

### Updated LSL Inventory Map [7.B.ii.c]

On March 5, 2020, the LSL Inventory was made publicly available on the Denver Water lead website (<https://www.denverwater.org/your-water/water-quality/lead>).

On July 30, 2024, the publicly available map was updated and reposted, incorporating the June 30, 2024, LSL Inventory. An updated inventory summary table is provided with each semiannual -report.<sup>32</sup> The website map is updated quarterly to reflect these changes to the LSL Inventory and will be updated and re-posted in the summer.

### Summary of Changes to the LSL Inventory [7.B.ii.d]

Between Jan. 1 and June 30, 2024, updates to the LSL Inventory continued as additional data were gathered and reviewed. During this period, 32,169 changes were made to the LSL Inventory of which 8,742 were changes to the status of the service line (i.e., p-value).<sup>33</sup> This

<sup>32</sup> See Appendix INV-1 Summary of Service Line Status and p-Value (First Six-Month Period of 2024).

<sup>33</sup> See Appendix INV-2B Line by Line p-Value Changes by Status (First Six-Month Period of 2024).

included: changes based on confirmation from Denver Water, customers and distributors; review of historical data; direct evidence such as water quality and/or potholing; and replacements. In addition to material status changes, 16,391 service lines were removed from the inventory as tap cuts, non-potable service connections or properties that are no longer serviced by Denver Water. Additions to the inventory included service lines previously deemed inactive (added back to the inventory upon review of the data) and new construction (previously not included in the inventory), affecting 7,036 properties in this reporting period.<sup>34</sup> These changes are accounted for in Table 14.

#### LCRR INVENTORY PREPARATION

The LCRR requires an initial lead service line inventory to be submitted by Oct. 16, 2024, with all properties classified as unlikely LSL and likely LSL to be classified as unknown. To prepare for this submittal and reduce the number of unknowns in the lead service line inventory, Denver Water conducted over 10,000 investigations in 2024, equating to 6,683 distinct service lines investigated. The cumulative number of unknown service lines investigated since program inception is about 50% of the unknown service lines from Denver Water's baseline LSLI submitted in 2019. Denver Water will be submitting the LCRR lead service line inventory in August 2024.

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<sup>34</sup> See Appendix INV-2B Line by Line p-Value Changes by Status (First Six-Month Period of 2024).



## 7.B.iii LSL Replacements

Section 7.B.iii of the LCRR Variance requires that Denver Water report and maintain records of LSL replacements, including the following:

*iii. LSL Replacements.*

- a. the address and date of all LSL replacements occurring during the variance, including by year;*
- b. the type of LSL replacement (as outlined in paragraph 4.B);*
- c. the unique customer identification number of Customer Premises on the refusal list and documented attempts to contact the property owner; and*
- d. those Customer Premises where Denver Water performed a partial LSL replacement and property owner consent could not be obtained.*

*Text is taken verbatim from the LCRR Variance, dated Nov. 30, 2022.*

Replacements under the ALSLR Program started on March 5, 2020, and results from Jan. 1 to June 30, 2024, are described in this section. An overview of the LSL replacement requirements is shown in Table 23.

**TABLE 23. OVERVIEW OF 7.B.III REQUIREMENTS**

Paragraph Reference	Description	Refer to
<b>4.E</b>	Offer post-LSL replacement sampling within six months.	Ongoing.
<b>7.B.iii.a</b>	Address and date of all replacements.	See Appendix. <sup>2</sup>
<b>7.B.iii.b</b>	Type of replacement.	See Table 24 and Appendix. <sup>3</sup>
<b>7.B.iii.c</b> <b>4.H</b>	Refusal list with service point ID and documented attempts for customer contact. Track changes in customer account holders against Service Line Refusal List.	See Appendix. <sup>4</sup>
<b>LRPP III.D (p 62)</b>	Provide education and filters to residents of multifamily properties on the Service Line Refusal List.	Not applicable for this reporting period. <sup>1</sup>
<b>7.B.iii.d</b>	Number of properties where a partial replacement was performed, and consent was not granted by the property owner to replace a lead service line in full.	See Table 24 and Appendix. <sup>4</sup>
<b>LRPP III.D (p 57)</b>	Replace LSL at properties with consistently high lead release and critical customers.	Described in this section.
<b>LRPP III.D (p 58)</b>	Complete approximately 2,000 investigations per year in the first five years of the Lead Reduction Program to update the predictive model and improve the quality of information in the LSL Inventory.	See Table 21.
<b>LRPP III.D (p 60)</b>	Property owners will be reminded via English and Spanish signage placed at the limits (ends of streets) within geographic work areas four to five weeks in advance of construction.	Implemented July 20, 2020.
<b>LRPP III.D (p 60)</b>	Provide flushing instructions following LSL replacement.	Provided to all customers in post-LSL replacement education package. <sup>5</sup>

<sup>1</sup> There were 37 multi-unit properties added to the Refusal List in 2024. These customers are in the Filter Program, receive mailed educational materials (both with the replacement filters and via the annual filter reminder postcard), and will receive sampling kits in late 2024.

<sup>2</sup> See Appendix LSL-1 Addresses and Types of Replacement (First Six-Month Period of 2024).

<sup>3</sup> See Appendix LSL-2 LSL Replacement Refusal List (First Six-Month Period of 2024).

<sup>4</sup> See Appendix LSL-3 Properties with a Partial Replacement (Cumulative since Program Inception).

<sup>5</sup> See Appendix COE-21 Updated Post-Replacement Flushing Instructions from the 2022 Annual Report.

Figure 6 below shows the lead service line replacements year-to-date (Jan. 1, 2024, through June 30, 2024) as well as program-to-date (Jan. 1, 2020, through June 30, 2024). The dashboard also details the consent form responses received during this reporting period. Further detail on lead service line replacements and consent form responses for this reporting period are available within this section of the report.

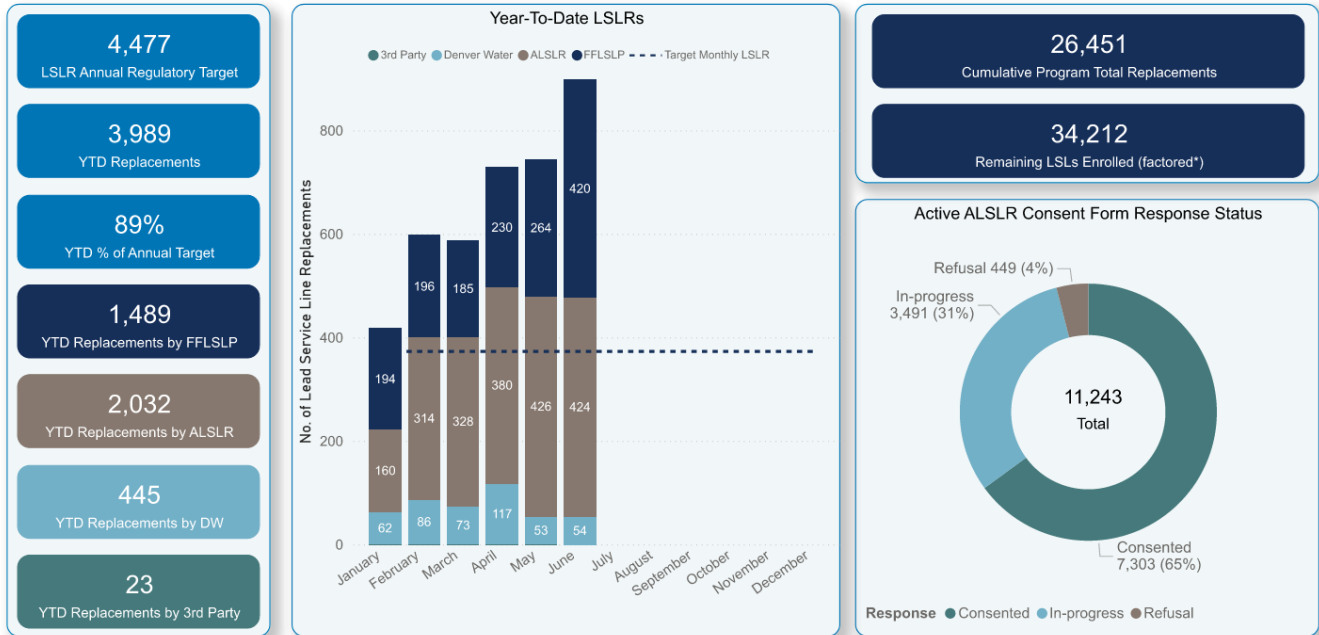
**LEAD REDUCTION PROGRAM**

Report Period 1/1/2024 to 6/30/2024

**ALSLR**



Year: 2024



The information presented in the dashboard should be used for program management reporting. Regulatory reporting requires additional data review and update prior to the time of submittal.

**FIGURE 6. LEAD SERVICE LINE REPLACEMENT DASHBOARD**

**Summary of LSL Replacement Activity during the Reporting Period including Address and Date of Replacement [7.B.iii.a]**

Denver Water crews started LSL replacements in the fifth program year on Jan. 1, 2024. ALSLR contractors started on Jan. 17, 2024, and federal contractors started on Jan. 2, 2024. The ALSLR and federal contractors focused primarily on geographic task order work areas, with newly consented properties from adjacent task orders from previous program years. Newly consented properties include properties that had an ownership change that resulted in the new owner providing consent, or properties that were either a refusal or no response that recently changed to consented. A total of 11 geographic task orders, each with approximately 500 to 600 properties, were developed and issued to three ALSLR contractors. A total of 11 work areas, each with approximately 400 to 500 properties, were developed and issued to three federal contractors. Additional work areas will be issued in the second half of 2024. A list of addresses and dates for each replacement can be found in the appendices.<sup>35</sup>

Denver Water crews completed LSL replacements as part of water main replacement work and emergency repairs and assisted with geographic area LSL replacements. Denver Water crews continue to target critical customers at schools, daycare centers, and child care facilities within City and County of Denver to confirm the status of the service line and replace lead where found. The properties originally included in previous ALSLR Plans that required additional follow-up to make three reasonable attempts at contact were included in the 2024 ALSLR Plan. Any

<sup>35</sup> See Appendix LSL-1 Addresses and Types of Replacement (First Six-Month Period of 2024).

daycare or child care facility added to CDPHE’s licensed child care facility dataset since 2020 was added to the 2024 ALSLR Plan. At the start of the year, the critical customer list included 887 properties verified as critical customers within the City and County of Denver.<sup>36</sup> Most of these were properties from previous ALSLR Plans with a small number of newly identified critical customers for the 2024 ALSLR Plan. Since the start of the year, 22 properties were removed from the critical customer list upon confirmation of a non-LSL via investigation and four LSLs were replaced in the 2024 ALSLR Plan. At the end of this reporting period, 47 critical customers remain with either likely or confirmed LSLs. For these remaining properties, all contact attempts have not resulted in a response or the property is slated for future activities. Investigation of service line materials and replacement (as needed) will be completed as consent is received.

As part of the Elevated Lead Response Plan, Denver Water crews perform prioritized individual replacements at properties where lead is measured above 150 µg/L and at properties where lead is measured above 25 µg/L, the properties shall be prioritized as they are added to task orders as part of the 2024 or future ALSLR Plan.

#### Type of LSL Replacements Completed during this Reporting Period [7.B.iii.b]

Section 4.A of the Variance provides that “[e]ach Program Year, Denver Water shall achieve a minimum replacement rate of at least 7.0% of the estimated number of LSLs and GRRs in its distribution system based on a cumulative average.” The overall intention of this requirement is to ensure that all LSLs are replaced within 15 years following the effective date of the Dec. 16, 2019, Variance.

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<sup>36</sup> This number includes all critical customers within the service area, regardless of p-value.

**TABLE 24. TYPE OF LSL REPLACEMENTS (JAN. 1 TO JUNE 30, 2024)**

Type of LSL Replacement Jan. 1 to June 30, 2024 <sup>1</sup>	Denver Water (Watermain, Emergency, and ALSLR) <sup>2</sup>	Third Party (Developer, Homeowner, and Other) <sup>3</sup>	Total
<b>Full Lead Replacement<sup>4</sup></b>	1,935	23	1,958
<b>Partial Lead Replacement, such that no Lead Remains After Replacement<sup>5</sup></b>	1,436	0	1,436
<b>Full Galvanized Replacement</b>	29	0	29
<b>Partial Galvanized, such that no Lead or Galvanized Remains After Replacement<sup>6</sup></b>	566	0	566
<b>TOTAL REPLACEMENTS in Reporting Period, with no Lead Remaining After Replacement</b>	<b>3,966</b>	<b>23</b>	<b>3,989</b>
<b>TOTAL REPLACEMENTS Not Previously Reported<sup>7</sup></b>	42	15	57
<b>TOTAL REPLACEMENTS completed since LRP Inception</b>	<b>25,112</b>	<b>1,339</b>	<b>26,451</b>
<b>Emergency Repair, Partial Replacement (i.e., where consent was NOT granted and lead may remain in the ground)<sup>8</sup></b>	15	0	15

<sup>1</sup> Properties that had a replacement on or before June 30, 2024, may not have been captured in the database for this report due to the time necessary to QA the data following the replacement date. Replacements affected by this time lag will be reported in the Annual Report for 2024.

<sup>2</sup> Includes LSL replacements completed as part of water main projects, emergency repairs, scheduled repairs, and ALSLR and federal individual and geographic replacements completed by Denver Water or its contractors.

<sup>3</sup> Includes LSL replacements completed by developers, property owners and other government agencies as identified in Appendix LSL-1 (Addresses and Types of Replacement (First Six-Month Period of 2024)).

<sup>4</sup> Includes replacements of service lines described as lead-lead, lead-galvanized, lead-unknown and galvanized-unknown. This also includes service lines designated as either unknown-unknown or copper-copper with p-value  $\geq 0.5$  at properties where a service line replacement was completed by someone other than the ALSLR contractors (such as third party).

<sup>5</sup> Includes replacements of service lines described as lead-copper, lead-PEX, lead-PVC and copper-unknown. If verification reveals copper at three or more locations, the service line is counted as replaced if the p-value is  $\geq 0.5$ . See Appendix LSL-1 (Addresses and Types of Replacement (First Six-Month Period of 2024)).

<sup>6</sup> Includes replacements of service lines described as copper-galvanized, galvanized-copper, and galvanized-PEX.

<sup>7</sup> This includes replacements completed since Program inception but not previously reported (57 added); see Appendix LSL-4 (Addresses and Types of Replacements for Properties Not Previously Counted and Duplicates (Since Program Inception)).

<sup>8</sup> Includes all properties cumulative since program inception; see Appendix LSL-3 (Properties with a Partial Replacement (Cumulative since Program Inception)).

### Customer Consent and Refusal List for LSL Replacement [7.B.iii.c]

Per Section 7.B.iii.c of the LCRR Variance, Denver Water must provide “the unique customer identification number of Customer Premises on the refusal list and documented attempts to contact the property owner.” Distribution of notification letters, including consent forms, was initiated in October 2023, to property owners included in the 2024 ALSLR Plan. Since then, notifications were mailed to all properties identified in the geographic work areas of the 2024 ALSLR Plan, after which multiple contacts are made to obtain signed consent forms.<sup>37</sup>

<sup>37</sup> See Appendix LSL-2 LSL Replacement Refusal List (First Six-Month Period of 2024).

Reconnaissance or pre-construction meetings are conducted with each property owner to plan the LSL replacement work and schedule the replacement.

A summary of the number of property owners contacted and number of signed consent forms returned is presented in Table 25. Between Jan. 1 and June 30, 2024, a total of 449 property owners refused to participate in the ALSLR Program or were non-responsive following multiple attempts at contact. At least three attempts to obtain voluntary consent from a property owner are undertaken before work can start to replace the LSL.

**TABLE 25. SUMMARY OF CONSENT AND LSL REFUSAL LIST (JAN. 1 TO JUNE 30, 2024)**

Description	Customer Consented <sup>1</sup>	Customer Refused <sup>2</sup>
<b>Total Number of Properties for which Consent was Given or Refused during the First Six Months of 2024</b>	7,303	449

<sup>1</sup> The total number of signed consent forms represent the ALSLR contractors and Denver Water crew work. A revised procedure to track all Denver Water crew consents was implemented in 2023.

<sup>2</sup> The total number of refusals year-to-date includes attempts made by the ALSLR contractors (86 properties), federal contractors (346 properties) and Denver Water crew efforts (17 properties). These include properties with descriptions of “consent not granted due to refusal” (123 properties) and “non-responsive” after at least three attempts were made and the task order goes through administrative close out (326 properties). When a customer refuses or is non-responsive, the service point ID is provided to the COE team for follow-up. See explanations in Appendix LSL-2 LSL Replacement Refusal List (First Six-Month Period of 2023).

A range of outreach methods is used to contact property owners.<sup>38</sup> Denver Water sends at least two attempts at contact by mail plus one attempt at contact using a different method, such as email, phone calls or door-to-door canvassing. A property is described as pending while the task order for the affected work order remains open (i.e., there is ongoing construction activity). A property is considered non-responsive and added to the Refusal List as task orders for a work area are closed out (i.e., the construction crew demobilizes). This process is part of administrative closeout of the task order. Non-responsive properties, in addition to the two mailers and one door-to-door canvas, will receive two to three more door-to-door attempts as well as an email and/or phone call for additional outreach attempts.

While the ALSLR contractors are in an area with active construction activity, additional attempts, such as door-knocking, phone calls and emails, may be made to contact the property owner to seek consent. If an owner refuses to participate in the ALSLR Plan, the property is added to the LSL Replacement Refusal List, along with an explanation for refusal, if available. If a property owner declines due to a previous undocumented service line replacement, additional information may be requested from the owner to document a past replacement to support the removal of the property from the LRP.

When a property owner declines to participate, Denver Water is committed to continuing engagement with the property owner to encourage participation. A database is maintained to track attempted contacts at properties where consent to replace the LSL has not been

<sup>38</sup> See Appendix COE-14 2024 COE Plan included with the Annual Report for 2023.

provided.<sup>39</sup> An outreach approach was identified for customers with properties on previous Refusal Lists who have not had an ownership change and therefore have not been contacted through the ownership change follow-up process. Denver Water conducts investigative potholes at properties from previous years' Refusal Lists within or adjacent to identified 2024 task orders, provided there is no conflict, no street moratoriums or the property is already identified as lead as part of 2024 task orders. At non-responsive properties, Denver Water conducts a four-point investigation (two potholes main-to-meter and two potholes meter-to-building), and, at refusal properties, Denver Water conducts two main-to-meter potholes where possible to identify the service line material. Previous refusals that could be identified as non-lead under a four-point investigation were removed from the inventory. Denver Water will continue outreach to previous refusals where lead was found to gain consent and perform a replacement despite previous contact attempts and refusal. Additionally, any change to the property ownership triggers additional outreach to obtain consent to replace the LSL. Between Jan. 1 and June 30, 2024, five changes in ownership occurred at properties on the Refusal List. Follow-up is underway to gain consent for replacement from the new owner within a year of the change of ownership.<sup>40</sup>

There are circumstances where consent has been given, but an inspection of the property reveals a safety or security hazard that prevents the LSL replacement from being performed. The property owner is informed, both verbally and in writing, that the hazard must be addressed within 14 days of receiving the notification. If the problem is not fixed within that timeframe, the property is treated as not responsive and is added to the list of non-responsive properties until the issue is resolved and the LSL can be replaced.<sup>41</sup>

### [Emergency Repairs Resulting in a Partial LSL Replacement \[7.B.iii.d\]](#)

During this reporting period, 15 partial replacements occurred as a result of emergency repair, water main replacement or third-party contractor work (i.e., some lead may remain in the ground). This affected a total of 142 properties since program inception in January 2020 for the following reasons:<sup>42</sup>

- No consent or no available contact information for the property owner and therefore consent could not be obtained at the time of the work (this affected six properties).
- The property owner declined replacement at the time of the work (this affected 36 properties).
- No consent to perform the full replacement due to no response from the property owner (this affected 84 properties).

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<sup>39</sup> See Appendix LSL-2 LSL Replacement Refusal List (First Six Months of 2024).

<sup>40</sup> See Appendix LSL-5 Ownership Changes for Properties on the Refusal List (First Six-Month Period of 2024).

<sup>41</sup> See Appendix COE-D.12 Safety or Repairs Needed Notification Letter of Second Quarter Report (2020).

<sup>42</sup> See Appendix LSL-3 Properties with a Partial Replacement (Cumulative since Program Inception).

- Restricted access due to the interior plumbing arrangement or unsafe working conditions (this affected nine properties).
- Property redevelopment (three properties).
- To be rescheduled because property owner was not comfortable with replacement during COVID-19 (two properties).
- Meter to main replaced, meter to building potholing and/or replacement scheduled for a later date (two properties).

Attempts to obtain consent to complete the replacement in full were made and outreach with the property owner continues to seek consent or address any safety issues that currently bar entry to the property.



## 7.B.iv Filters

Section 7.B.iv of the LCRR Variance requires that Denver Water report and maintain records related to its filter distribution program. Specifically, Section 7.B.iv requires reporting and recordkeeping of the following:

*iv. Filters.*

- a. summary of addresses of Customer Premises where filters and replacement cartridges have been provided, and certification of the number of homeowners with confirmed or likely LSLs that are not part of filter program because they use their own filter or bottled water. Detailed records must be retained by Denver Water and provided to EPA or CDPHE upon request;*
- b. the total number of filters and replacement cartridges distributed per Program Year;*
- c. the percent filter adoption for each year of the variance<sup>43</sup>, and the method used to determine this rate;*
- d. a list of unique customer identification numbers reporting the use of bottled water or a filter certified NSF/ANSI (53) for removal of lead, and any changes in the list;*
- e. a list of unique customers identification numbers for customers enrolled in the filter program who have refused a filter or replacement cartridges or have opted out of enrollment in the filter program;*
- f. filter lead sampling results collected under paragraph 5.F above;*
- g. information about filter use under paragraph 5.E; and*
- h. Denver Water shall notify CDPHE and EPA within 30 Days if data indicate lead levels are about 5 ppb in filtered drinking water and shall provide the measured levels of lead in filtered water. All other levels shall be reported in the semi-annual and yearly reports.*

*Text is taken verbatim from the LCRR Variance, dated Nov. 30, 2022.*

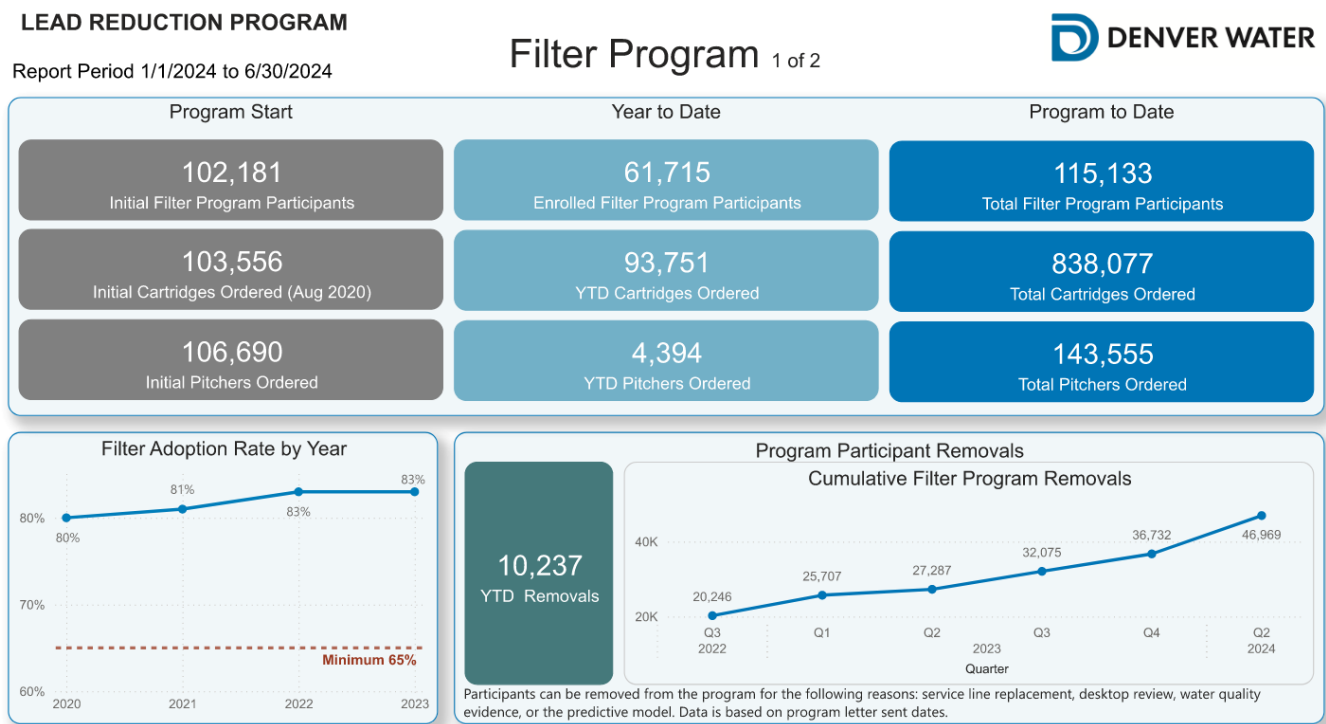
Denver Water provides pitcher filters and filter cartridges to all customers within the service area that have the potential for a lead service line. Every six months, per the manufacturer's recommendations, customers receive filter cartridge replacements. The initial pitcher filter distribution was launched in 2020, and any customers that are added to the program are promptly sent a filter pitcher and cartridge. Customers can request a pitcher or cartridge replacement, read about the Filter Program and watch a video on proper filter usage through Denver Water's filter webpage.

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<sup>43</sup> The LCRR Variance requires a filter adoption survey every other year, rather than every year, as previously required in the LCR Variance. As stated in the LRPP technical amendment, Denver Water will use the adoption rate of the previous year's survey on non-survey years for the purposes of the equivalency model.

The Filter Program includes the distribution of pitcher filters, ongoing outreach and education to encourage pitcher filter use and the distribution of filter cartridge replacements. The Filter Program targets properties with confirmed and likely LSLs (i.e., with p-values 0.5 and higher). Using the current LSL Inventory from Table 14, it is estimated that Filter Program participants consist of approximately 61,715 Denver Water household units.

Figure 7 features the Filter Program dashboard that helps capture day-to-day tracking of the filter program. The dashboard tracks Filter Program participants, pitcher deliveries and cartridge deliveries since the initial pitcher distribution in 2020 as well as year-to-date and program-to-date. The dashboard also shows the filter adoption rate from every year of the program (2020 through 2023, as a formal filter survey will not be sent in 2024 under the updated Variance) and the Filter Program participant removals.<sup>44</sup> Filter Program participants are removed either for a service line replacement or an investigation that identifies the service line as confirmed non-lead. Further details on the Filter Program are described throughout this section.



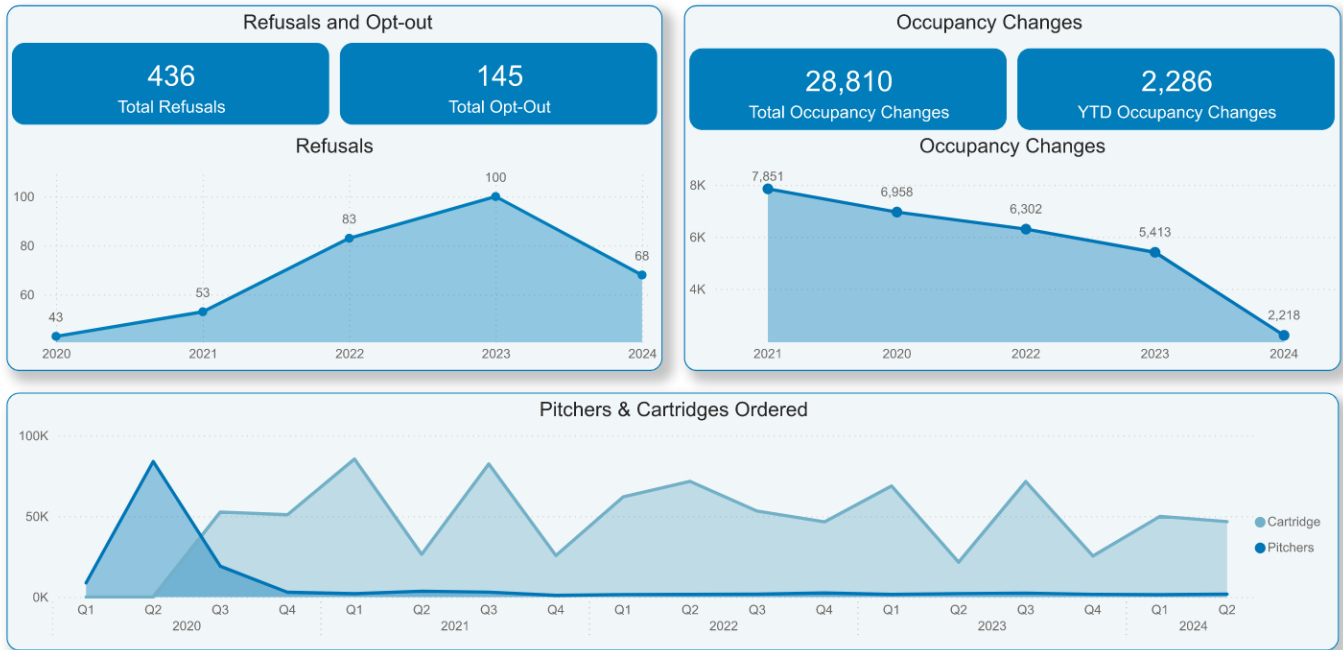
The information presented in the dashboard should be used for program management reporting. Regulatory reporting requires additional data review and update prior to the time of submittal.

**FIGURE 7. FILTER PROGRAM (1 OF 2) DASHBOARD**

Figure 8 below shows the year-over-year Filter Program refusals, occupancy changes, and opt-outs, as well as the number of pitchers and every quarter since program inception. Additional details on the refusals and opt-outs are described in Section 5.C, 7.B.iv.a, and 7.B.iv.e of this report.

<sup>44</sup> Per the Variance, the formal filter adoption survey is to be sent every other year, beginning in 2023. Therefore, a formal filter adoption survey will not be sent in 2024. The next formal filter adoption survey will be sent in 2025.

## Filter Program 2 of 2



The information presented in the dashboard should be used for program management reporting. Regulatory reporting requires additional data review and update prior to the time of submittal.

**FIGURE 8. FILTER PROGRAM (2 OF 2) DASHBOARD**

This section summarizes the milestones of the Filter Program to-date, including filter refusals/opt-outs, six-month supply of replacement filters distributed post-LSL replacement, filter survey results from the ALSLR Program and filter performance testing in the field. An overview of the filter reporting requirements is shown in Table 26.

**TABLE 26. OVERVIEW OF 7.B.IV REQUIREMENTS**

Paragraph Reference	Description	Refer to
7.B.iv.a	Summary of addresses of all customers enrolled in the Filter Program and provided with filters and cartridges. Certification of number of customers with a confirmed or likely LSL that use their own filter or bottled water.	See Table 27.
7.B.iv.b	Total number of filters and cartridges distributed per year.	See Table 27.
7.B.iv.c	Percent filter adoption rate during a survey year. <sup>1</sup> Description of method to determine the filter adoption rate.	See the 2023 Annual Report.
7.B.iv.d	Maintain list of addresses and Service Point Identification that use a filter or bottled water and any changes to the list.	See Appendix. <sup>2</sup>
7.B.iv.e 5.A	Maintain Filter Refusal or Opt-Out List. Maintain list of addresses and SP IDs that have refused enrollment in the Filter Program or opted out.	See Appendix. <sup>3</sup>
7.B.iv.f 7.B.iv.g 5.F.ii	Confirmation of filter performance in the field (50+ locations included in the LCR compliance sampling).	See Appendix for sample results from Feb. 13 to May 31, 2024. <sup>2</sup>

Paragraph Reference	Description	Refer to
	Collect samples using a protocol approved by EPA and CDPHE. Collect additional information regarding the use and operation of the filter.	Protocol for filter sample collection approved July 17, 2020, by EPA. Included in this section.
<b>7.B.iv.h</b>	Notify CDPHE and EPA within 30 days of receiving sample results indicating measurable lead in filtered samples.	See Appendix. <sup>4</sup>
<b>5.B</b>	Distribute replacement cartridges to customers enrolled in the Filter Program per the filter manufacturers' recommended replacement rate and until six months after LSL replacement.	See this section. Distribution as part of Filter Program since March 24, 2020.
<b>5.C</b>	Provide education materials within two weeks of a change in customer account. Provide filters and replacement cartridges within 35 days of a change in customer account.	See Appendix. <sup>5,6</sup>
<b>5.D</b>	Offer filters to 1983 to 1987 households with a child up to 24 months of age and lead > 3 µg/L in the first bottle of the three-bottle test. Develop COE plan to focus on this audience.	See this section and results in section 7.B.i CCT. See 2024 COE Plan.
<b>5.E.i</b>	Survey enough customers enrolled in the Filter Program to receive a minimum of responses from remaining program participants that is consistent with a 95% confidence level and 3% margin of error. Seek approval from CDPHE and EPA for the filter adoption survey questions prior to distribution.	See 2023 Annual Report. Approved on Sept. 10, 2020. <sup>7</sup>
<b>5.G</b>	Document contact to provide lead outreach and education materials to at least 95% of customers enrolled in the Filter Program each year.	Postcards will be sent in the second half of 2024.
<b>LRPP Executive Summary (p 9) and III.C (p 56)</b>	If the localized filter adoption rate is less than 65%, additional outreach and education will be provided to that area.	Not applicable for this reporting period.
<b>LRPP III.C (p 55)</b>	Survey filter use as part of ALSLR Program following LSL replacement.	See this section and Appendix. <sup>8</sup>

<sup>1</sup> The LCRR Variance requires a filter adoption survey every other year (starting in 2023), rather than every year, as previously required in the LCR Variance. As stated in the LRPP technical amendment, Denver Water will use the adoption rate of the previous year's survey on non-survey years for the purposes of the equivalency model.

<sup>2</sup> See Appendix FIL-1 Filter Program Opt-Outs (First Six-Month Period of 2024).

<sup>3</sup> See Appendix FIL-2 Filter Program Refusals (First Six-Month Period of 2024).

<sup>4</sup> See Appendix FIL-3 Confirmation of Filter Performance in Field Results (First Six-Month Period of 2024).

<sup>5</sup> See Appendix FIL-4 Occupancy Changes – COE Distribution (First Six-Month Period of 2024).

<sup>6</sup> See Appendix FIL-5 Occupancy Changes – Pitcher Filter Distribution (First Six-Month Period of 2024).

<sup>7</sup> See Third Quarter Report of 2020 (Appendix FIL-29 OMB Approved Filter Adoption Survey Questions).

<sup>8</sup> See Appendix FIL-6 Informal Filter Adoption Survey Results Summary (First Six-Month Period of 2024).

### Initial Filter Distribution to All Customers Enrolled in the Filter Program [7.B.iv.a]

Per Section 7.B.iv.a of the LCRR Variance, Denver Water must provide a “summary of addresses of Customer Premises where filters and replacement cartridges have been provided, and certification of the number of homeowners with confirmed or likely LSLs that are not part of the filter program because they use their own filter or bottled water. Detailed records must be retained by Denver Water and provided to EPA or CDPHE upon request.” Denver Water began filter distribution on Feb. 12, 2020, with distribution to customers included in the ALSLR Program in 2020 (Year 1). Denver Water initiated broader filter distribution on March 28, 2020, to all customers enrolled in the Filter Program. Initial filter distribution was completed on Sept. 21, 2020.

Pitcher filter distribution continues for occupancy changes and customer-requested replacements for broken or missing pitcher filters, as shown in Table 27 for pitcher filter distribution.

**TABLE 27. SUMMARY OF FILTER DISTRIBUTION (JAN. 1 TO JUNE 30, 2024)**

Description	Count	Comment
<b>Initial Pitcher Distribution for Customers Enrolled in 2024</b>	269	
<b>Total Number of Households Provided with a Filter Kit between Jan. 1 and June 30, 2024</b>	3,844	
<b>Number of Households that Use their own NSF-Certified Filter or Bottled Water between Jan. 1 and June 30, 2024</b>	5	See Appendix. <sup>1</sup>
<b>Number of Households that Declined to Use a Filter or Bottled Water between Jan. 1 and June 30, 2024</b>	75	See Appendix. <sup>2</sup>

<sup>1</sup> See Appendix FIL-1 Filter Program Opt-Outs (First Six-Month Period of 2024).

<sup>2</sup> See Appendix FIL-2 Filter Program Refusals (First Six-Month Period of 2024).

The count for initial distribution of pitcher filters in Table 27 includes new customers enrolled in the Filter Program as well as customers that were previously enrolled in the Filter Program but that failed to receive their initial pitcher filter. Customers receiving an initial pitcher filter in 2024 represents less than 1% of the current 61,715 customers enrolled in the Filter Program. Circumstances where customers did not receive their initial pitcher filter arose for a variety of shipping reasons, usually due to a missing or erroneous address.

Addresses where filters could not be delivered were investigated for accuracy and a filter kit and program introduction booklet were sent once the address could be confirmed. Corrective actions have been implemented to reconcile all known addresses, identify incorrect addresses and distribute pitcher filters as required. As part of this exercise, 269 properties were reviewed during the first six-month period of 2024.

An analysis of return-to-sender addresses was performed in 2020 and described in the Third Quarterly Report for 2020; this exercise was not repeated. However, throughout 2024, return-to-sender addresses continued to be investigated and upon reconciliation, a filter kit is re-

sent to the correct address or if vacant, the property is removed from the LRP. As part of the return-to-sender analysis, 3,086 properties were reviewed.<sup>45</sup> 74 of these properties were pitcher kit deliveries and 3,012 were replacement cartridge deliveries.

### Replacement Filter and Replacement Filter Cartridge Distribution to Customers Enrolled in the Filter Program [7.B.iv.b]

Per Section 7.B.iv.b of the LCRR Variance, Denver Water must report “the total number of filters and replacement cartridges distributed per Program Year.”

Between Jan. 1 and June 30, 2024, filter kits were distributed to an additional 3,844 customers enrolled in the Filter Program.<sup>46</sup>

During this same period, 88,522 replacement filter cartridges were distributed to 67,792 addresses of customers enrolled in Filter Program in accordance with the manufacturer’s recommendation for replacement within six months. Following the improvements made in July 2021 to address late filter distribution, all properties enrolled in the Filter Program received replacement filter cartridges within the six-month replacement interval.<sup>47</sup> Of the 88,522 replacement filter cartridges distributed, however, 3,012 attempted replacement cartridge deliveries were unsuccessful and returned to sender.<sup>48</sup> An unsuccessful delivery prompts an investigation, and, upon reconciliation, a replacement filter is re-sent to the correct address or if vacant, the property is removed from the LRP. A summary of distribution of post-LSL replacement filters is provided in Table 28.

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<sup>45</sup> 3,086 addresses were reviewed as part of the return-to-sender analysis. However, a higher number of return-to-senders were noted by the warehouse. Not all addresses were able to be provided and therefore were not reviewed.

<sup>46</sup> This number refers to the number of properties that received a new filter based on occupancy changes, high-capacity, broken filters, lost filters, etc. This number also includes hand deliveries to customers. However, it does exclude any Return to Senders. The number of filters distributed to these properties totals 3,844.

<sup>47</sup> See the First Semi-Annual Report of 2021 for more details.

<sup>48</sup> See Appendix FIL-7 Filter Program Replacement Cartridge Returns (First Six-Month Period of 2024).

**TABLE 28. SUMMARY OF SIX-MONTH SUPPLY POST-LSL REPLACEMENT FILTER DISTRIBUTION (JAN. 1 TO JUNE 30, 2024)**

Description	Count	Comment
<b>Number of Households Provided with Six-Month Supply of Filter Replacements Post Lead Service Line Replacement between Jan. 1 and June 30, 2024<sup>1,2</sup></b>	3,650	This includes emergency repairs and replacements performed by Denver Water and third parties.

<sup>1</sup> This value may not match the number of lead service line replacements completed between Jan. 1 and June 30, 2024. For example, if a customer received their initial filter pitcher and replacement filters within two months of having their lead service line replaced, additional replacement filters are provided on the six-month replacement schedule and not as part of the lead service line replacement activities.

<sup>2</sup> This value includes filter distribution to properties where the lead service line replacement was completed by a third party, as identified in Table 24.

### Filter Distribution to Formula-fed Infants in Select Households [5.D]

Section 5.D of the LCRR Variance states, “Upon request, Denver Water will provide lead water quality sampling at no cost to any customer within its service area. If a child up to 24 months of age resides in a Select Household and the water quality results in the first draw sample show lead concentrations above 3 ppb, Denver Water must offer a filter and enough replacement filters and cartridges, at no cost, to the customer until the child exceeds the age of 24 months.”

No 1983 to 1987 households with children under 24 months of age requested enrollment in the Filter Program during the first six-month reporting period of 2024 (i.e., a select household as identified in paragraph 5.D of the LCRR Variance).<sup>49</sup>

### Formal Filter Adoption Survey [7.B.iv.c]

Under Section 5.E.i of the LCRR Variance, “Denver Water must conduct a survey in 2023 and every other program year of randomly selected customers enrolled in the Filter Program to receive a minimum of responses from remaining program participants that is consistent with a 95% confidence level and 3% margin of error. The survey must inquire whether the customer has used the filter for water to make infant formula (if applicable); cooking and drinking; or is using bottled water or a filter device that is certified NSF/ANSI (53) for lead removal not provided by Denver Water for infant formula, cooking and drinking.” Per Section 7.B.iv.c of the LCRR Variance, Denver Water must report “the percent filter adoption for each year of the variance, and the method used to determine this rate.”

Filters are used to reduce exposure to lead before the lead service line is replaced and for six months following LSL replacement. The rate of filter adoption by customers enrolled in the LRP is used as an input in the equivalency model.

Filter adoption assumes customers are accepting, installing, using and maintaining their pitcher filter properly, including replacing the filter cartridge at the appropriate time and using the pitcher filter for drinking, cooking and infant formula, as applicable. The minimum filter adoption

<sup>49</sup> See Appendix CCT-4 Summary of Water Quality Sampling Results from Select Households (1983 to 1987 Homes, Cumulative since Program Inception).

rate identified in the Lead Reduction Program Plan necessary to match the performance of the orthophosphate alternative is 65%.

The formal Filter Adoption Survey was approved by EPA on Sept. 10, 2020. The survey for 2023 was conducted and resulted in an 83% adoption rate. For additional details, refer to the 2023 Annual Report.

### Informal Filter Adoption Survey

Informal surveys of filter use are conducted during ALSLR pre-construction meetings and during virtual meetings asking customers about filter adoption and use. Responses from 5,399 participants were captured in the LRP database from the pre-construction meetings and 429 customers responded to all questions in the informal filter adoption survey.<sup>50,51</sup>

- Of those 429 customers, 413 indicated that they used filtered or bottled water for drinking (96%) and 408 customers indicated they use their filter for cooking (95%).
- 100% of households with a formula-fed infant indicated that they used filtered water when preparing formula. Of which, 13 customers indicated they have an infant under 24 months who is formula fed and all 13 customers used filtered water.

Looking solely at customers who are leaving the filter program: Of the total 5,399 responses, 2,660 had service line replacements between Jan 1, 2024, and June 30, 2024. This accounts for 49% of all customers who had their LSLs replaced in 2024 (3,989 total line replacements) and suggests that most customers are using filtered or bottled water for drinking, cooking and infant formula during their time in the filter program:

- Of the 2,660 customers who had service line replacements, 199 customers responded to the informal filter adoption survey. 188 customers indicated that they used filtered or bottled water for drinking (94%) and 185 customers indicated they use their filter for cooking (93%).
- 100% of households with a formula-fed infant indicated that they used filtered water when preparing formula. Seven customers indicated they have an infant under 24 months who is formula fed and all seven customers used filtered water.

Informal surveys of overall filter use and barriers to using filtered water for cooking are conducted as part of virtual community meetings when those meetings focus on filter use.

### Occupancy Changes [5.C]

Section 5.C of the LCRR Variance states “If a change in the customer name of the water account associated with a customer enrolled in the filter program occurs at any time, Denver Water must provide the new customer with educational materials as soon as possible but no later

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<sup>50</sup> See Appendix FIL-6 Informal Filter Adoption Survey Results Summary (First Six-Month Period of 2024).

<sup>51</sup> See Appendix FIL-8 Informal Filter Adoption Survey Detailed Responses (First Six-Month Period of 2024).



than 30 Days following the change in customer account. If the Customer Premise or a residential unit at the Customer Premise is enrolled in the filter program, Denver Water must distribute a new filter and replacement cartridges per manufacturers' recommended replacement rate to the new customer within 35 Days of the change in customer account. Denver Water will also make filters available for pick-up at the customers' election."

Denver Water was notified of 2,286 occupancy changes between Jan. 1 and June 30, 2024, which resulted in pitcher filters being delivered to these residences.<sup>52</sup> 1,694 property owners were alerted of these occupancy changes and received an introductory booklet.<sup>53</sup> Occupancy changes are tracked daily to provide multiple mailings per week to allow new occupants to receive their LRP Introductory Letter and LRP Overview Booklet within 14 days of the change in occupancy. Occupancy changes are added to weekly filter distribution batches to allow new occupants to receive a pitcher filter within 35 days of notice of new occupancy. Both the introductory materials and the filters were distributed within 14 and 35 days respectively, at all properties where a change in occupancy occurred for this reporting period.<sup>54</sup>

#### Filter Opt-Out List of Customers using Bottled Water or an Alternate Filter [7.B.iv.d]

Per Section 7.B.iv.d of the LCRR Variance, Denver Water must report "a list of unique customer identification numbers reporting the use of bottled water or a filter certified NSF/ANSI (53) for removal of lead, and any changes in the list."

The number of properties that chose to opt-out of the Filter Program to date is relatively small. Customers that opt-out of the Filter Program are contacted by Denver Water to understand the reason for opting out. Of the 145 customers that have opted out since the launch of the Filter Program, 25 use bottled water as an alternative to the filter and 32 use their own filter certified National Sanitation Foundation (NSF) 53 for lead removal. For the 88 remaining customers, Denver Water was unable to confirm if the customer was using an NSF 53-certified filter.<sup>55</sup> A summary of the Filter Program opt-outs is shown in Table 29. Contact with customers continues as part of an annual reminder to customers that have opted out or previously refused to participate in the Filter Program.<sup>56</sup>

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<sup>52</sup> See Appendix FIL-5 Occupancy Changes - Pitcher Filter Distribution (First Six-Month Period of 2024).

<sup>53</sup> Property owners can have multiple occupancy changes within one week. Rather than sending multiple introductory booklets, one introduction booklet will be sent to the property owner.

<sup>54</sup> See Appendix FIL-4 Occupancy Changes – COE Distribution (First Six-Month Period of 2024).

<sup>55</sup> See Appendix FIL-1 Filter Program Opt-Outs (First Six-Month Period of 2024).

<sup>56</sup> The use of an NSF 53 certified filter could not be confirmed at some properties based on call center records. This affected 12 customers that indicated that they use their own filter; these properties were moved from the Opt-Out List to the Refusal List.

**TABLE 29. SUMMARY OF FILTER PROGRAM OPT-OUTS**

Program Year	Total Opt Outs	Number of Properties		
		Confirmed Using Own Supplied NSF 53 Certified Filter	Confirmed Using Bottled Water	No Confirmation of NSF 53 Certified Filter or Bottled Water
2020 (Jan. 1 to Dec. 31, 2020)	63	9	6	48
2021 (Jan. 1 to Dec. 31, 2021)	43	6	5	32
2022 (Jan. 1 to Dec. 31, 2022)	25	11	6	8
2023 (Jan. 1 to Dec. 31, 2023)	9	6	3	0
2024 (Jan. 1 to June 30, 2024)	5	0	5	0
<b>Total Removed from LRP due to Non-Lead Designation or LSL Replacement</b>	1	0	1	0
<b>Total Since LRP Inception<sup>1</sup></b>	145	32	25	88

<sup>1</sup> The one opt-out removed due to a service line replacement is opting out of their final six-month post-LSL replacement cartridge and therefore are technically still in the program at this time.

**Filter Refusal List [7.B.iv.e]**

Per Section 7.B.iv.e of the LCRR Variance, Denver Water must report “a list of unique customers identification numbers for customers enrolled in the filter program who have refused a filter or replacement cartridges or have opted out of enrollment in the filter program.”

From Jan. 1 to June 30, 2024, notice of refusal to participate in the Filter Program was received for 75 properties.<sup>57</sup> The reasons given for refusal included that the pitcher is too heavy to use or that the resident had a water quality test and is not concerned about the low level of lead in their water. This brings the total number of refusals to 436 since the inception of the LRP. A summary of the refusals to date is shown in Table 30.

**TABLE 30. SUMMARY OF FILTER REFUSAL LIST**

Reporting Period	Number of Properties Refusing to Participate
2020 (Jan. 1 to Dec. 31, 2020)	30
2021 (Jan. 1 to Dec. 31, 2021)	73
2022 (Jan. 1 to Dec. 31, 2022)	158
2023 (Jan. 1 to Dec. 31, 2023)	100
2024 (Jan. 1 to June 30, 2024)	75
<b>Total Removed from LRP due to Non-Lead Designation or LSL Replacement Since LRP Inception</b>	11
<b>Total Since LRP Inception</b>	436

<sup>57</sup> See Appendix FIL-2 Filter Program Refusals (First Six-Month Period of 2024). This includes customers who have had their line replaced and are refusing delivery of their final replacement cartridge.

## Summary of Data to Document Filter Distribution and Filter Program Participation

Additional details related to filter kit distribution are provided in the Appendices:

- List of premise addresses and service point identification numbers for all households that refuse to participate in the Filter Program.<sup>58</sup>
- List of premise addresses that have returned replacement cartridges to sender.<sup>59</sup>
- Filter adoption survey results summary from informal filter use surveys conducted in the field as part of LSL replacement and virtual meeting filter survey summary.<sup>60</sup>
- Detailed responses from the informal filter use field survey responses collected as part of LSL replacement activities.<sup>61</sup>
- Confirmation of pitcher filter performance in the field.<sup>62</sup>
- List of premise addresses and service point identification numbers for all households that opt-out of the Filter Program.<sup>63</sup>
- Occupancy changes for pitcher filter distribution.<sup>64</sup>
- Occupancy changes for filter education information.<sup>65</sup>

### Confirmation of Filter Performance in the Field [7.B.iv.f]

Per Section 7.B.iv.f of the LCRR Variance, Denver Water must report filter lead sampling results collected. Field sampling is conducted by Denver Water in conjunction with LCR compliance sampling (see section 7.B.i). All samples collected to meet this requirement for the first six-month compliance period of 2024 are included in this reporting period. Samples were collected from 81 properties between Feb. 13, 2024, and May 31, 2024. Samples are collected using a protocol with three sample bottles to differentiate between lead measured in the first draw LCR compliance sample and lead measured in water used in filter testing and referred to as the filter influent sample. The third sample is collected from filter effluent and used with the filter influent sample to calculate the percentage of lead removal.

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<sup>58</sup> See Appendix FIL-2 Filter Program Refusals (First Six-Month Period of 2024).

<sup>59</sup> See Appendix FIL-7 Filter Program Replacement Cartridge Returns (First Six-Month Period of 2024).

<sup>60</sup> See Appendix FIL-6 Informal Filter Adoption Survey Results Summary (First Six-Month Period of 2024).

<sup>61</sup> See Appendix FIL-8 Informal Filter Adoption Survey Detailed Responses (First Six-Month Period of 2024).

<sup>62</sup> See Appendix FIL-3 Confirmation of Filter Performance in Field Results (First Six-Month Period of 2024).

<sup>63</sup> See Appendix FIL-1 Filter Program Opt-Outs (First Six-Month Period of 2024).

<sup>64</sup> See Appendix FIL-5 Occupancy Changes - Pitcher Filter Distribution (First Six-Month Period of 2024).

<sup>65</sup> See Appendix FIL-4 Occupancy Changes - COE Distribution (First Six-Month Period of 2024).

Lead was measured in the unfiltered tap water at less than 1 µg/L in 30 samples collected on the same day the filter effluent sample was collected. Lead was measured below the detection limit in filtered water at 65 of the 81 properties and below 3 µg/L at most properties with two exceptions<sup>66</sup>. If lead is measured above 10 µg/L from a filter, the filter is removed from the property, the customer is provided with a new filter, and the “old” filter is sent to the Denver Water lab for additional testing (using the water supplied from the lead pipe rack). Zero properties in this reporting period had lead measured above 10 µg/L in the filter effluent sample.

Results from filter testing in the field are also reviewed to identify properties with elevated lead in the first bottle for inclusion in the Elevated Lead Response Plan. There were zero properties with lead measured above 15 µg/L in the first bottle.

#### [Information About Filter Usage and Maintenance Collected during Filter Performance Testing \[7.B.iv.g\]](#)

Per Section 7.B.iv.g of the LCRR Variance, Denver Water must report information about filter use. Observations of filter use during filter performance testing in the field are reported with sampling results. When there are customers who are identified for inclusion in the filter performance testing in the field that do not use their filter, a sample is not collected from the filter. For this reporting period, no customers indicated that they did not use the filter provided by Denver Water.

#### [Confirmation of Direct Contact with 95% of All Customers Enrolled in the Filter Program \[5.G\]](#)

Per Section 5.G of the LCRR Variance, “Denver Water must make direct contact with lead outreach and education materials to 95% of all customers enrolled in the filter program in every Program Year.” In 2024, proof of contact with customers enrolled in the LRP is measured based on the mailing of filter reminder postcards. The postcards will be mailed in the second half of 2024 and will be discussed in the 2024 Annual Report.

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<sup>66</sup> See Appendix FIL-3 Confirmation of Filter Performance in Field Results (First Six-Month Period of 2024).

## 7.B.v Compliance Metrics per Paragraphs 2.C, 3.D, 4.I, 5.G, 6.B and 6.C

Section 7.B.v of the LCRR Variance requires that Denver Water report and maintain records of the following compliance metrics:

*v. Compliance Metrics. Results achieved under the compliance metrics in paragraphs 2.C [CCT Metric], 3.D [LSL Inventory Compliance Metric], 4.I [Accelerated LSL Replacement Compliance Metric], 5.G [Filter Communication Compliance Metric], 6.B [Comprehensive LRPP Performance Metric], and 6.C [Health Equity and Environmental Justice Metric] above.*

*Text is taken verbatim from the LCRR Variance, dated Nov. 30, 2022.*

A summary of the performance metrics that will ultimately be used to evaluate the overall performance of the LRP is presented in Table 31.

**TABLE 31. SUMMARY OF COMPLIANCE**

<b>Paragraph</b>	<b>Description</b>	<b>Comment</b>
<b>2.C</b>	<b>C. Corrosion Control Treatment Metric.</b> Denver Water <u>must maintain pH and alkalinity within the ranges designated by CDPHE. For the entry points to the distribution system, pH must fall within a range of 8.6 to 9.0 and a minimum alkalinity of 20 mg/L as CaCO<sub>3</sub>; for distribution system location, pH must fall within a range of 8.5 to 9.1 and a minimum alkalinity of 20 mg/L as CaCO<sub>3</sub>. CDPHE may modify these required water quality parameter ranges through a modification decision under 5 CCR 1002-11.26(3)(d)(ii).</u>	<b>See Section 7.B.i</b>
<b>3.D</b>	<b>D. LSL Inventory Compliance Metric.</b> Denver <u>Water must Investigate a cumulative average of 1.4% of the total estimated number of unknown service lines in the inventory each Program Year from January 1, 2020, to the Variance End Date. By the Variance End Date there must be no remaining sites in the inventory categorized as a lead, galvanized requiring replacement, or lead status unknown, as defined in paragraph 1.</u>	<b>See Section 7.B.ii</b>
<b>4.I</b>	<b>I. Accelerated LSL Replacement Compliance Metric.</b> Denver Water <u>must annually achieve at least a 7.0% cumulative average Program Year LSL replacement rate as determined based on reporting required in paragraph 7.B. If not achieved, Denver Water shall provide public notice within 30 Days to all customers enrolled in the filter program, as required under paragraph 1.T.ii.</u>	<b>See Section 7.B.iii</b>
<b>5.G</b>	<b>G. Filter Communication Compliance Metric.</b> Denver Water <u>must make direct contact with lead outreach and education materials to 95% of all customers enrolled in the Filter Program in every Program Year. . . Compliance shall be tracked by mailing lists and mail receipts, lists of customer email addresses for customers who elect to receive email communication, or other forms of documentation approved by CDPHE.</u>	<b>See Section 7.B.vi</b>
<b>6.B</b>	<b>B. Comprehensive LRPP Performance Metric.</b> Denver Water <u>must demonstrate to EPA’s satisfaction, using the updated equivalency model results as reported under paragraph 7.C, that the combined actual performance of the LRPP as implemented continues to be “at least as efficient as” OCCT as that term is used in 40 C.F.R § 141.82(e) and as it relates to CDPHE’s March 2018 designation of OCCT as orthophosphate treatment for Denver Water, in reducing lead exposure on an annual basis.</u>	<b>To be presented in the 2024 Annual Report</b>
<b>6.C</b>	<b>C. Health Equity and Environmental Justice (HE and EJ) Compliance Metric.</b> i. Denver Water <u>must annually achieve a cumulative Program Year LSL replacement rate in areas with HE and EJ concern that is equal to or greater than the total replacement rate.</u> This calculation is the number of LSLs replaced per year in areas with HE and EJ concerns divided by total number of LSLs in areas with HE and EJ concerns must be equal to or greater than the average number of LSLs replaced per year overall divided by total number of LSLs as of the variance effective date. ii. Denver Water <u>must make direct contact with lead outreach and education materials to more than 95% of customers as identified in areas with HE and EJ concerns enrolled in the filter program in every Program Year.</u>	<b>See Section 7.B.vii</b>

## 7.B.vi Communications, Outreach and Education

Section 7.B.vi of the LCRR Variance requires that Denver Water report and maintain records for COE activities:

- vi. Communications, Outreach and Education. A summary of activities conducted under the Communications, Outreach and Education program, including the updated communications, outreach and education plan for the new Program Year. The summary will include, at a minimum:*
- a. a description of outreach activities conducted, including copies of the outreach materials provided; and*
  - b. a list of any partner organizations who conducted, or were involved in the implementation of the communications, outreach and education plan.*

*Text is taken verbatim from the LCRR Variance, dated Nov. 30, 2022.*

During the first six months of 2024, Denver Water continued its public outreach and engagement efforts based on the strategies described in the 2024 COE Plan. This included hosting four virtual community meetings on construction preparedness and filter use, convening the Stakeholder Advisory Committee for two quarterly meetings and supporting new tactics to increase consent for service line replacement. COE efforts specific to each LRP element are also included in those element sections of this report.

**TABLE 32. OVERVIEW OF 7.B.VI REQUIREMENTS**

Paragraph	Description	Comment
<b>7.B.vi</b>	2020 COE Plan 2021 COE Plan 2022 COE Plan 2023 COE Plan 2024 COE Plan	See First Quarter Report of 2020. See Fourth Quarter Report of 2020. See Second Semi-Annual Report of 2021. See 2022 Annual Report. See 2023 Annual Report.
<b>7.B.vi.a</b>	Description of COE activities conducted. Copy of materials.	Discussed in this section. See Appendices for copies of materials included. <sup>1</sup>
<b>7.B.vi.b</b>	Ambassador Program Overview.	See Section 7.B.vii.
<b>7.B.vi.c</b>	Response, date and time of in-person surveys of filter adoption and use.	See Section 7.B.iv. See Appendix. <sup>2</sup>
<b>8.G</b>	Notify customers enrolled in Filter Program of LRP and launch multi-media campaign.	Multi-media campaign launched March 23, 2020.
<b>LRPP III.E (p 64)</b>	Targeted messaging to homes with copper piping and lead solder to flush the tap after periods of non-use.	See 2020, 2021, 2022, 2023 and 2024 COE Plans.
<b>LRPP III.F (p 74)</b>	Stakeholder Advisory Committee	Discussed in this section.

<sup>1</sup> See Appendices COE-2 through COE-11 for a copy of materials.

<sup>2</sup> See Appendix FIL-8 Informal Filter Adoption Survey Detailed Responses (First Six-Month Period of 2024).

### Outcomes of COE Activities between Jan. 1 and June 30, 2024 (unless otherwise noted) [7.B.vi.a]

- Denver Water hosted two bilingual, one-hour virtual community meetings in January and April 2024 focused on preparing customers for lead service line replacement. To promote the meetings, 11,940 outbound calls were made to customers identified for an upcoming lead service line replacement the day before and the day of the events, with 7,638 bilingual voicemail messages left for those who did not answer. In total, 1,398 customers participated in a construction-focused virtual community meeting during the first six months of the year.
- Denver Water also hosted two bilingual, one-hour virtual community meetings in June 2024 focused on filter use. To promote the meetings, 38,579 outbound calls were made to all customers in the LRP Filter Program, with 26,063 bilingual voicemail messages left for those who did not answer. 1,900 customers participated in a filter-focused virtual community meeting during the first six months of the year.
- In addition, Denver Water received requests for LRP presentations and/or attendance at community events from 10 local, state and national organizations and held these presentations at various times during this reporting period.



- The Stakeholder Advisory Committee convened for two quarterly meetings, Feb. 8 and May 30. The meetings included progress updates on the LRP, updates to 2024 tactics based on lessons learned (specifically water testing incentive removal, plans for a shut-off pilot and insights from multifamily outreach), progress in preparing for Lead and Copper Revisions and the plan to allow tenant signature on service line replacement consent forms. A service line replacement site visit for the committee is being planned for late summer 2024.
- In January, Denver Water and Aurora Water hosted a roundtable for communications professionals from Front Range water utilities to discuss the communications needs related to the upcoming Lead and Copper Rule Revisions and to share information about their approach in handling the requirements. The group held one more meeting in February to continue sharing information and determined moving forward they would reach out directly to each other for support as needed.
- Contact was made on 26 occasions with Denver City Council and Mayor’s Office and officials in suburban jurisdictions to share information and updates on the LRP.
- The LRP website received 479,368 visits and 803,894 page views since the launch of comprehensive LRP information on March 5, 2020.<sup>67</sup>
- Stories published on TAP (denverwater.org/TAP) with content related to the LRP received 23,100 views.<sup>68</sup>
- Denver Water social media activity reached approximately 102,426 individuals.
- The LRP was mentioned in 85 news media stories, with a potential aggregate readership of 469 million across online news, blogs and television.<sup>69</sup>

The following section highlights COE program activities carried out in 2024 from Jan. 1 through June 30 (unless otherwise noted), organized by strategy type.

## Public Outreach

Overview of activity grouped by outreach component:

- Virtual Meetings
  - Denver Water hosted two bilingual, one-hour construction preparedness virtual community meetings, Jan. 16 and April 24, for customers slated to receive a service line replacement in 2024.

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<sup>67</sup> See Appendix COE-11 Website Traffic.

<sup>68</sup> See Appendix COE-10 TAP Stories Published.

<sup>69</sup> See Appendix COE-9 Earned Media Report.

- These meetings were an opportunity to inform customers about what to expect before, during and after service line replacement, including the importance of filter use and flushing.
- To promote the meetings, 11,940 outbound calls were made to customers identified for service line replacement the day before and the day of the event, with 7,638 bilingual voicemail messages left for those who did not answer. Emails were also sent to customers where Denver Water had email addresses.<sup>70</sup> 1,398 customers participated in these meetings.
- Denver Water also hosted two bilingual, one-hour virtual community meetings, June 25 and 27, focused on filter use.
- To promote the meetings, 38,579 outbound calls were made to all customers in the LRP Filter Program, with 26,063 bilingual voicemail messages left for those who did not answer. Emails were also sent to customers where Denver Water had email addresses.<sup>71</sup> 1,900 customers participated in a filter-focused virtual community meeting during the first six months of the year.
- In total, 3,298 customers participated in a virtual community meeting in the first six months of 2024.
- Presentations and panel presentations were provided to organizations upon request to provide an overview of the LRP, gather feedback and identify areas for potential coordination. These meetings included the following:
  - Jefferson Park Registered Neighborhood Association (Feb. 13).
  - Utility Management Conference (Feb. 15).
  - Washington Park East Neighborhood Association (March 12).
  - American Water Works Association Webinar – Communication about Lead (March 27).
  - Chesapeake AWWA - A.I. – Harnessing the Power (panel presentation on LRP predictive model and inventory refinement) (April 2).
  - Chesapeake AWWA - The Race to Replace – Lead Service Lines (April 3).
  - Highland Merchants Association (May 8).
  - AWWA - Distribution Systems Unregulated Inorganics and Why You Should Monitor Them (presentation on pH adjustment) (May 15).

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<sup>70</sup> See Appendix COE-4 Virtual Community Meeting Email Invitations.

<sup>71</sup> See Appendix COE-4 Virtual Community Meeting Email Invitations.

- AWWA Annual Conference & Expo– Shovels, Software and Soft Skills: How to Build a Successful Lead Service Line Replacement Program (June 12).
  - AWWA ACE – Landscape Transformation for Water Efficiency (Plants & Pipes) (June 12).
- Stakeholder Advisory Committee
  - The Stakeholder Advisory Committee met for its first and second quarterly meetings of 2024 on Feb. 8 and May 30.
    - Representatives reflected a diverse group of organizations including health care, education, nonprofit and government.<sup>72</sup>
    - At the February meeting, Denver Water provided an overview of LRP progress through 2023, progress from early 2024, updates on tactics (water testing incentive removal and approach to refusals), and an overview of Lead and Copper Rule Revisions versus Lead and Copper Rule Improvements.
    - At the second quarterly meeting on May 30, Denver Water provided an update on LRP progress (including the milestone of replacing 25,000 service lines), the process to allow tenant signature on consent forms and lessons learned from multifamily outreach.
- Government Relations
  - 26 proactive contacts and/or meetings were held with local government officials and staff, including Denver City Council and Mayor’s Office and officials in suburban jurisdictions, to share information and updates for the LRP.
    - Now that the LRP is in well underway, most of these updates included information on upcoming work areas and construction in respective Denver City Council Districts as well as updates on issues potentially impacting customers.
  - Outside of the proactive updates, staff continued to be responsive to questions from government officials, as needed.
- Distributor Communications
  - An update on the LRP was provided at the Jan. 16 and May 30 distributor forum meetings.
  - Distribution of water quality sampling kits and results continues when requested by distributors’ customers. Distributor LRP customers also receive replacement filters and, when there is a change in occupancy, a new filter kit.

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<sup>72</sup> See Appendix COE-2 Stakeholder Advisory Committee Membership List.

- Denver Water also sends distributor customers the same program removal mailings as for City and County of Denver customers. Mailings are sent when a property is removed from the LRP either due to investigation confirming a non-lead service line or six months after a lead service line has been replaced.
- On a bimonthly basis, distributors with properties in the LRP are provided an inventory update which reflects any changes made to the status of properties in their area because of investigations or service line replacement.
- Nearly 500 potholing investigations were completed in two distributor areas (City of Sheridan and Wheat Ridge) during the first six months of 2024.
- Earned Media
  - The LRP was covered in digital, print and broadcast news, including Bloomberg Law, FOX31, The Colorado Sun, El Comercio de Colorado and a number of local news outlets from across the country.<sup>73</sup>
- There were 111 posts about the LRP on social media channels in this reporting period, resulting in 102,426 impressions. Ambassador Program partners also shared Denver Water social media posts on their own networks.
  - Denver Water also provided content for organization and neighborhood newsletters on request.
- Digital Communications
  - Denver Water distributed an email on June 21 to a database of 55,869 subscribers. The email promoted upcoming virtual community meetings, marked the milestone of replacing 25,000 service lines, reminded customers about the importance of water testing and shared information on summer watering rules.<sup>74</sup>
  - Fourteen TAP stories were published on [denverwater.org/TAP](https://denverwater.org/TAP) which included content related to the LRP. As of June 30, these stories had received 23,100 views. One story also included [a video marking the milestone of replacing 25,000 lead service lines](#).<sup>75</sup>
  - The LRP website, [denverwater.org/Lead](https://denverwater.org/Lead) (English) and [denverwater.org/Plomo](https://denverwater.org/Plomo) (Spanish), was updated with the recordings of the virtual community meetings, dashboards, an updated lead service line inventory and an updated pipe replacement map with the work areas for 2024. Since the launch of the LRP, [denverwater.org/Lead](https://denverwater.org/Lead) has received 479,368 visits and 803,894 page views. There were 31,169 unique website visits from Jan. 1 to June 30, 2024. Since launching

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<sup>73</sup> See Appendix COE-9 Earned Media Report.

<sup>74</sup> See Appendix COE-8 June Subscriber Email.

<sup>75</sup> See Appendix COE-10 TAP Stories Published.

in October 2021, [denverwater.org/Plomo](https://denverwater.org/Plomo) (the Spanish version of the website) has received 7,353 visits and 10,261 page views. There were 1,595 unique website visits from Jan. 1 to June 30, 2024.<sup>76</sup>

### Material Development and Owned Media [7.B.vi.a]

The following materials were developed from Jan. 1 through June 30, 2024:

- The public-facing dashboard was updated to share progress and key metrics for the LRP through June 2024.<sup>77</sup> The updated dashboard is posted monthly to [denverwater.org/Lead](https://denverwater.org/Lead) and is available in both English and Spanish.
- The LRP website ([denverwater.org/Lead](https://denverwater.org/Lead)) was updated to streamline content and improve navigation, making it easier for customers to find need-to-know information.
- Information on the LRP was included in the January and March issues of WaterNews, the monthly bill insert included with the bills of more than 180,000 customers who receive a bill from Denver Water. The information covered program progress through 2023, the milestones of replacing 21,000 and subsequently 25,000 service lines and what customers in the LRP need to know and do regarding filter use, construction and water testing.<sup>78</sup>
- A Year-in-Review summary was developed to capture 2023 milestones, progress and key program updates in a more digestible format than the full annual report. Stakeholders can share the summary with their organizations, networks and leadership to provide an overview and snapshot of the program. A summary document will be developed for each future year to outline the previous year's highlights.<sup>79</sup>
- ALSLR Program
  - The lead service line replacement consent form was updated to allow for tenant signature and removed the option for refusal to maximize the likelihood of obtaining consent.<sup>80</sup>
  - To support the shut-off pilot, Denver Water developed 30-day and 15-day letters, an email and various robocall scripts to notify non-responsive customers about a potential water shut-off at their property. The one-month advance notice goes above and beyond Denver Water's operating rules which require 14-day notice.<sup>81</sup>

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<sup>76</sup> See Appendix COE-11 Website Traffic.

<sup>77</sup> See Figure 1.

<sup>78</sup> See Appendix COE-3 January and March Issues of WaterNews.

<sup>79</sup> See Appendix COE-1 2023 Year-in-Review.

<sup>80</sup> See Appendix COE-5 Lead Service Line Replacement Consent Form (Updated).

<sup>81</sup> See Appendix COE-6 Shut-off Pilot Customer Notifications.

## Internal Communications and Coordination

The following summarizes efforts to continue to educate Denver Water's employees and contractors about the components and messaging of the LRP. This ongoing engagement supports the ability of Denver Water staff and representatives to provide customers with accurate information and enhances efforts to make the LRP accessible by all.

- Internal trainings and information-sharing sessions continued to be held as needed or requested to update Denver Water teams and departments on the LRP and prepare them for handling customer or community inquiries as appropriate. Five sessions were held between Jan. 1 and June 30.
- Talking points continue to be developed and updated for Customer Care and other customer-facing groups to support consistent and timely responses to customer inquiries.

### Above and Beyond Stories

- In May, crews were performing a service line replacement and helped a neighbor get a cat out of a tree.
- Also in May, a customer reached out after their service line replacement stating that the sprinkler line was broken because of the replacement work. The contractor went back to the property to talk to the owner and investigate the issue and found that the plumbing company that installed the backflow preventer did it backwards, which was causing the issue. The contractor not only fixed this issue, but they also fixed a broken valve in the sprinkler valve box. None of these problems were related to the work they did in replacing the water service line.

## 7.B.vii Health Equity and Environmental Justice

Section 7.B.vii of the LCRR Variance requires Denver Water to report and maintain records related to activities implemented to achieve its Health Equity and Environmental Justice principles:

- vii. Health Equity and Environmental Justice. A summary of activities conducted and designed to address HE and EJ principles set forth in the LRPP, including:*
- a. a description of how the HE and EJ principles are being incorporated into the accelerated LSL replacement program, lead filter program, and communications, outreach and education plan;*
  - b. socioeconomic or demographic data collected from outside sources (e.g., census data, local public health agencies) to target communications, outreach and education programs to specific neighborhoods, demographic cohorts, or non-English speaking groups;*
  - c. description of the values used to calculate compliance with the HE and EJ compliance metric for LSLR and lead outreach and education materials, as described in paragraph 6.C.i; and*
  - d. summary of information showing that outreach and education materials have been provided to at least 95% of the households in He and EJ areas of concern enrolled in the filter program in 6.C.ii. Detailed records must be retained by Denver Water and provided to EPA or CDPHE upon request.*

*Text is taken verbatim from the LCRR Variance, dated Nov. 30, 2022.*

A commitment to equity informs all aspects of the LRP, supporting accessibility, awareness and equitable participation for all customers. An overview of HE&EJ reporting requirements is presented in Table 33.

**TABLE 33. Overview of 7.B.vii Requirements**

Paragraph Reference	Description	Refer to
<b>7.B.vii LRPP V (p 77)</b>	Summary of activities conducted and designed to address HE&EJ principles.	Described in this section. See LRPP (p 77).
<b>7.B.vii.a</b>	Description of how HE&EJ principles were incorporated into the implementation of the: <ul style="list-style-type: none"> <li>• ALSLR Program.</li> <li>• Filter Program.</li> <li>• COE Plan.</li> </ul>	See First Quarter Report of 2020 and updates in this section.
<b>7.B.vii.b</b>	Socioeconomic or demographic data collected from other sources to target communications, outreach and education programs to specific neighborhoods, demographic cohorts, or non-English speaking groups.	See this section for how data informed COE activities.
<b>7.B.vii.c</b>	Description of values used to calculate compliance with the HE&EJ compliance metric for LSLR and lead outreach and education materials.	Described in this section.
<b>7.B.vii.d</b>	Summary of information showing that outreach and education materials have been provided to at least 95% of the households in HE&EJ areas of concern enrolled in the Filter Program.	See Section 7.B.vi.a. and this section.
<b>LRPP V (p 77)</b>	Commitment to continue to consult and collaborate with the organizations and HE&EJ experts, stakeholders, community members and customers to continually improve upon integration of the HE&EJ principles with the Lead Reduction Program.	See this section.
<b>LRPP V (p 79)</b>	Collaborate with other agencies to address lead exposure from all sources.	Described in this section.

### HE&EJ Integration in the Lead Reduction Program

From the beginning discussions that became the Lead Reduction Program, HE&EJ (equity) has been a foundational principle driving planning, decision-making, resource allocation, strategy and tactical development as well as work culture. Equity is not an additional consideration for these efforts; rather, it is the starting point. This commitment to advancing equity comes with a commitment to internal and external collaboration, learn by doing, openness, transparency and communication. In practice, this commitment means researching and talking with subject matter experts and communities to better understand community needs and preferences; taking time to build long-term relationships to build trust; asking for (and really wanting to hear) constructive feedback to improve; and an ongoing pledge to persist in the efforts and create progress, not perfection.

As the Lead Reduction Program has evolved, so too have its efforts and activities specific to advancing equity. The Ambassador Program, described below, has expanded to include more community partners focused on general outreach and activities that support specific program elements. Partners have also become intertwined with the identification of ALSLR work areas to approach engagement in a way most impactful for specific communities. Time and again, Denver Water finds that the work of trusted partners results in tangible, positive benefits for the program,



such as a 10-15% increase in consent for response rates once partners are involved. Given that Denver Water’s efforts around equity are more deeply woven into both general program outreach and specific program elements, this report has been refreshed so that community partner activities are described either under the overall program section and/or within specific element sections, based on the focus of activities completed. Because the nature of equity efforts and best practices are often evolving, key lessons learned are also described at the end of the HE&EJ section.

The terminology within this space is also rapidly changing in continued progress toward best capturing the characteristics of people and communities cumulatively impacted by policies, systems and associated outcomes. Throughout this section, the term “equity” is used in place of “HE&EJ.” This simplifies the language and reflects the broad scope to which the principles of equity can be applied. Similarly, the term “disadvantaged communities” has evolved to “disproportionately impacted communities.” This aligns with the definition adopted by the Colorado legislature and EPA’s EJScreen mapping tool. At present, the term best reflects the relative impact and challenges faced by some communities.

The following sections describe how principles of equity were integrated into the various components of the LRP during the first half of 2024.

### [Incorporating HE&EJ Principles via Communications, Outreach and Education \[7.B.vii.a, 7.B.vi.b and to support 7.B.vii.c\]](#)

#### [Ambassador Program](#)

Denver Water’s Ambassador Program is a partnership with community organizations to educate customers in disproportionately impacted communities about the LRP. These customized collaboration efforts expand the LRP’s reach, build awareness of program requirements and create momentum for behavior change in the appropriate culture and language most valued in harder-to-reach communities. There are three components of the Ambassador Program:

- **Contract Partners:** These partners conduct extensive on-the-ground outreach using culturally appropriate messaging with tailored outreach strategies to reach enrolled customers in prioritized communities.
- **Sponsorship Awards:** The sponsorship awards initiative launched in 2021 and provides funding to community organizations to either leverage their existing programs/services/events or create new opportunities to promote the LRP in targeted communities.
- **Information Partners:** Community organizations are recruited for their willingness to use their communication channels to promote the LRP.

## Contract Partners

- [CREA Results](#) is a community organization that specializes in the Latinx community. This group supported community outreach activities in the following neighborhoods:
  - Athmar Park.
  - Barnum.
  - Barnum West.
  - Chaffee Park.
  - Clayton.
  - Elyria-Swansea.
  - Globeville.
  - Harvey Park.
  - Regis.
  - Sunnyside.
  - West Colfax.
- During the first six months of 2024, CREA Results engaged in the following work:
  - Participated in 27 in-person or virtual events to educate residents within targeted neighborhoods about the LRP with an estimated reach of 3,080 people.
  - Conducted 16 sessions to canvas businesses in the Athmar Park, Harvey Park, Regis, Ruby Hill, Sun Valley, Sunnyside, West Colfax and Westwood neighborhoods, connecting with 92 businesses representatives, many of whom agreed to post and share LRP information at their establishments.
  - Conducted a total of 77 home visits to secure consent forms in the Chaffee Park neighborhood, where consent was needed to close out work in the neighborhood. 29% of the needed consent forms were secured through this effort alone.
  - Conducted email, phone and/or door-to-door outreach to 219 customers in targeted neighborhoods to encourage customers in the LRP to participate in the program and answer questions.
  - Hosted three radio shows about the LRP on KNRV (1150 AM), a Spanish language radio station, with an estimated reach of 10,000 listeners per show.
  - Secured seven articles in El Comercio de Colorado, a prominent Spanish-language publication with an estimated circulation of 45,000 readers per issue.<sup>82</sup>
  - Included LRP information in their January, February, March and May newsletters reaching about 8,279 individuals.
  - Posted LRP information on Facebook 53 times with an estimated 13,672 views.

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<sup>82</sup> See Appendix HEJ-1 Ambassador Program Spanish Language Articles.

## *Sponsorship Awards*

During the first six months of 2024, the following community organizations participated in the Ambassador Program as sponsorship awardees:

- [Denver Public Schools](#) is the public school system for the City and County of Denver.
  - Shared LRP information with DPS families at 17 community events, including vaccine fairs, hiring fairs and health clinics, reaching 1,211 individuals and 122 families.
  - Distributed information at DPS Community Hubs (a total of six), reaching approximately 1,618 people. Additionally, provided LRP information to Community Hub staff and at end-of-year celebrations at the Hubs, reaching 282 individuals.
  - Posted LRP information on Facebook 14 times with an estimated 3,126 views.
- [The Park People](#) is a local organization working with communities to plant trees and improve parks for a healthy, resilient future.
  - Used sponsorship support to fuel their annual investment in trees for community plants in the right of way and in yards.
  - Hosted various public events where LRP information was shared.
- [Tepeyac Community Health Center](#) is a nonprofit community health center whose mission is to inspire health, well-being and humanity in the Denver community, through all of life's stages.
  - Promoted the LRP at 40 community events, including family health nights, resource fairs, summer festivals and elementary school fairs, reaching approximately 1,500 people.
  - Integrated LRP content into the rotating digital message board in their clinic's lobby and waiting area.
- [Una Mano, Una Esperanza](#) is a community organization that specializes in the Latinx community. This group supported community outreach activities in the Athmar Park, Mar Lee and Westwood neighborhoods.
  - Promoted the LRP at six community events, including health institutes, family-friendly community gatherings and Una Mano, Una Esperanza service programs, reaching 1,369 people.
  - Promoted the LRP on Facebook to their 3,000 followers.
  - Conducted a total of 66 home visits to secure consent forms in the Athmar Park neighborhood, where consent was needed to close out work in the neighborhood. 24% of needed consent forms were secured.

### *Information Partners*

- [Denver Health](#) has been treating and healing the people of Denver for more than 160 years since its founding in 1860 to serve the health care needs of the community. It serves nearly 25% of Denver’s population annually.
  - Included information on the LRP in their “Warm Welcome” bags for approximately 4,000 families with newborns at Denver Health.

### *Example of Partners in Action:*

- Denver Public Schools works with thousands of families by providing programs and services that support the social, emotional, physical, academic and basic needs of families through six Community Hubs. Brenda Rodriguez, new Senior Manager of Community Hubs, has gone above and beyond to ensure she is trained and up to date with all aspects of the program so she can train her staff to help families navigate the LRP program.

### *Materials*

All customer-facing materials produced in 2024 have been translated into Spanish. The construction preparedness virtual community meetings presentation, promotional materials and follow-up communications were provided in both Spanish and English. Monthly dashboards for the LRP are available in Spanish and English at [denverwater.org/Plomo](https://denverwater.org/Plomo) and [denverwater.org/Lead](https://denverwater.org/Lead). Nine core program materials have also been translated into Vietnamese.<sup>83</sup>

The Spanish version of the LRP website, [denverwater.org/Plomo](https://denverwater.org/Plomo), continues to be updated and available to customers. To access the Spanish content, customers may simply click on the green “Español” button in the top right-hand corner of [denverwater.org/Lead](https://denverwater.org/Lead) or visit [denverwater.org/Plomo](https://denverwater.org/Plomo).

### *Early Childhood*

Opportunities to spread LRP messaging to the early childhood community and providers continued during the first six months of 2024. In collaboration with Denver Water’s Youth Education team, LRP messaging continues to be integrated into engagement with youth and their families. Community partner CREA Results continues to use the Youth Education’s team Water Wall, an interactive educational display targeted to children. The Youth Education team also incorporates LRP content on filter use into appropriate classroom visits where they engage students in hands-on learning activities.

As noted above, through partnership with Denver Health, information on the LRP is being included in “Warm Welcome” bags for families with newborns at Denver Health. Approximately

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<sup>83</sup> See Appendix HEJ-2 Vietnamese Materials.

4,000 Warm Welcome bags are distributed annually. In partnership with CDPHE, content on the LRP was also included in the February edition of their “Our Voice” newsletter which goes out to 1,484 subscribers in Colorado’s early childhood community

Sponsorships continue to be an avenue for spreading awareness of the LRP in the early childhood community. In March, Denver Water again sponsored the Rocky Mountain Early Childhood Conference. The sponsorship included hosting an LRP booth to interact with conference attendees who are largely educators and administrators in the early childhood community, as well as two posts on the Denver Early Childhood Council’s social media pages. Denver Water also sponsored the Denver Children’s Museum Free Joy Park Night. As part of this sponsorship, the museum included LRP information in its monthly e-newsletter and Denver Water maintains a booth on the free park evening to engage with parents.

### *Critical Customers*

Denver Water continues to conduct outreach to critical customer properties to replace lead service lines where found. Within the month, the team has begun conducting direct, targeted outreach to the 51 remaining properties in this category and has been able to successfully engage with nine properties to conduct an interior inspection, receive a consent form and/or connect with the appropriate staff member of the facility.

### [HE&EJ Principles Applied to ALSLR Program \[7.B.vii.a\]](#)

Denver Water provides its multicultural training program to ALSLR field observers and contractors. Multiple trainings took place in 2023 and a subsequent training is being planned for fall 2024. The training includes the following topics:

- Denver Water customer journey.
- Multicultural awareness.
- Multicultural principles.
- Self-awareness and working across cultures.
- Audience language discussion.
- Working with customers when English is not a first language and protocol for interpretation.
- Managing behaviors when working in the public sector (in the field and inside homes).
- Key program messages.
- Review of materials customers receive, including new documents developed since the original training in February 2020.
- A role-play scenario working through common customer situations.

Two virtual community meetings were held in January and April targeted toward customers identified for upcoming service line replacement to share what to expect before, during and after construction. The meetings were fully bilingual, from the initial meeting promotion to the meeting presentation and Q&A responses. The meeting recordings are also available in Spanish and English at [denverwater.org/Plomo](https://denverwater.org/Plomo) and [denverwater.org/Lead](https://denverwater.org/Lead).

As noted above, in an effort to gather more signed consent forms in the Chaffee Park neighborhood, community partner CREA Results conducted phone calls, emails and door-to-door canvassing to speak with relevant customers about providing consent. Out of the 77 properties they visited, 22 consent forms were secured, equivalent to a 28.7% success rate. Similarly, community partner Una Mano, Una Esperanza conducted phone calls, emails and door-to-door canvassing in the Athmar Park neighborhood to secure consent for service line replacement. Of the 66 properties they visited, 16 consent forms were secured, equivalent to a 24.3% success rate. Additionally, Denver Water and its contractor teams conduct additional outreach efforts beyond the minimum required to seek consent. These efforts include additional mailings, phone calls and emails to reach customers.

Construction field crews continue to use the iSpeak poster, which allows customers to select their preferred language from among 64 languages represented in the poster. Crews are then able to work with the customer and Denver Water to provide support in the preferred language.

### *2025 ALSLR Work Areas*

2025 ALSLR work area planning is underway and will be presented in the annual report.

### *HE&EJ Principles Applied to Filter Program [7.B.vii.a]*

Per Section 7.B.vii.a of the LCRR Variance, Denver Water must report “a description of how the HE and EJ principles are being incorporated into the accelerated LSL replacement program, lead filter program, and communications, outreach and education plan.”

All customers enrolled in the Filter Program received their initial filter kit in 2020 with enough replacement filters to last approximately six months. The distribution of additional replacement filters began Aug. 27, 2020, an approximate five-month cycle following the same schedule used for the initial filter distribution. This distribution continues in 2024.

### *Tenant Outreach*

Introductory program materials and filter kits continue to be provided to apartment complexes for distribution to tenants upon move-in. Coordination also continues with property managers to track material distribution.

During the first half of 2024, the LRP team conducted manual research to identify the most appropriate contact information for rental properties in the program. The team then conducted direct outreach via phone calls and emails using this contact information to initiate coordination for interior inspections when needed, to encourage coordination in making sure all

tenants have a filter pitcher and to secure consent for service line replacement if needed. 273 properties, with unit sizes ranging from less than 20 to over 50 units, were contacted. Of these, 34 properties initiated a request for additional filter pitchers, 27 coordinated on interior inspections and 78 provided consent for replacement. This effort will be continued in the second half of 2024.

### HE&EJ Compliance Metric [7.B.vii.c]

Section 6.C of the LCRR Variance requires Denver Water to ensure that the Program does not result in disproportionate impacts to areas with Health Equity and Environmental Justice concerns:

*C. Health Equity and Environmental Justice (HE and EJ) Compliance Metric. Denver Water will follow principles of environmental justice and equity in implementing the LRPP overall as reflected in its HE and EJ principles set forth in the LRPP. In addition, Denver Water will ensure that LSLRs are being conducted in a manner that does not result in disproportionate impacts to areas with HE and EJ concerns<sup>1</sup> as of the effective date of this variance. If Denver Water, CDPHE, and EPA determine that the changes in areas with HE and EJ concerns in future program years compared to those identified as of the effective date of the variance are significant, then the variance may be modified under 8.C to update the identified areas with HE and EJ concerns relied upon in this metric.*

- i. Denver Water must annually achieve a cumulative Program Year LSL replacement rate in areas with HE and EJ concern that is equal to or greater than the total replacement rate. This calculation is the number of LSLs replaced per year in areas with HE and EJ concerns divided by total number of LSLs in areas with HE and EJ concerns must be equal to or greater than the average number of LSLs replaced per year overall divided by total number of LSLs as of the variance effective date.*
- ii. Denver Water must make direct contact with lead outreach and education materials to more than 95% of customers as identified in areas with HE and EJ concerns enrolled in the filter program in every Program Year.*

<sup>1</sup> For the purposes of this Variance, areas with HE and EJ concerns are defined as any census block group with, as of the variance effective date, an 80th percentile ranking or above (when compared to either the U.S. or State) in EPA's EJScreen tool for one or more Supplemental Index. Text is taken verbatim from the LCRR Variance, dated Nov. 30, 2022.

The HE&EJ compliance metric is calculated using the equation below.

$$\frac{\text{average number of LSLs replaced per year}}{\text{total number of LSLs}} < \frac{\text{average number of LSLs replaced within HE\&EJ areas per year}}{\text{total number of LSLs within HE\&EJ areas}}$$

An area is defined as having HE&EJ concerns using EPA’s EJScreen tool<sup>84</sup> with a state or federal 80th percentile ranking or above for one or more of the following Supplemental Indexes:

- Particulate Matter 2.5
- Ozone
- Diesel Particulate Matter
- Air Toxics Cancer Risk
- Traffic Proximity
- Lead Paint
- Superfund Proximity
- RMP Facility Proximity
- Hazardous Waste Proximity
- Underground Storage Tanks
- Wastewater Discharge

Using the definition described above, 33,605 out of 63,955 LSL properties were identified within areas of HE&EJ concerns. Table 34 calculates the projected HE&EJ compliance metric for the 2024 program year. A total of 3,989 replacements were completed in the first six months of 2024, with 6,419 projected to be completed in the second six months of the year. Using both the actual and planned replacements, a projected 5,143 (53%) of those replacements are within areas of HE&EJ concerns. The cumulative replacement rate within HE&EJ areas of concern is projected to be 11.0% at the end of the calendar year and is higher than the projected overall cumulative replacement rate of 11.0%.

**TABLE 34. PROJECTED HE&EJ COMPLIANCE METRIC CALCULATION FOR 2024**

	Overall	Within Areas of HE&EJ Concern
<b>Total Number of LSL Replacements Completed in First Six Months of 2024</b>	3,989 <sup>1</sup>	2,210
<b>Projected Total Number of LSL Replacements Completed for 2024</b>	9,634	5,143
<b>Total Number of Properties with LSLs</b>	63,955 <sup>2</sup>	33,605 <sup>3</sup>
<b>Projected 2024 Replacement Rate</b>	10.0%	11.0%

<sup>1</sup> Total number of LSL replacements as of June 30, 2024. Refer to Table 15.

<sup>2</sup> Total number of LSLs as of the LCR Variance effective date (Jan. 1, 2020).

<sup>3</sup> Calculated using the p-values, from the Sept. 6, 2019, base inventory, of properties that are within areas with HE&EJ concerns, as defined by the EJScreen supplemental indexes as of Jan. 1, 2023.

In addition to replacements within areas of HE&EJ concerns, Denver Water is also required to send outreach to 95% of customers within these areas. As mentioned in Section 5.B, in 2024, proof of contact with customers enrolled in the LRP is measured based on the mailing of filter reminder postcards. The postcards will be mailed in the second half of 2024 to meet the

<sup>84</sup> Refer to <https://ejscreen.epa.gov/mapper/> for the EJScreen interactive map.



required 95% outreach metric for both properties within the Filter Program and properties within areas of HE&EJ concern. Additional outreach to areas of HE&EJ concern is described throughout the HE&EJ section of this report, particularly within the update on Ambassador Program activities.

## PART 3: LEARNING BY DOING

Five of the six elements that together make up the LRP are used to evaluate the overall effectiveness of the program (COE Plan, LSL Inventory, Filter Program, ALSLR Program and Corrosion Control Treatment). The sixth element is Learning by Doing — presented as a strategy (versus a desired outcome), as quantitative performance metrics were not identified in the Variance.

As part of the Learning by Doing element of the LRP, Denver Water is committed to:

- Evaluating the performance of the LRP to improve outcomes.
- Establishing an Advisory Committee to inform Denver Water on more efficient and effective ways to implement the LRP to achieve the LCRR Variance goals.

This means that Denver Water incorporates the Learning by Doing approach to improve outcomes during the life of the LRP. During the first six months of 2024, efforts continued to identify potentially more efficient or effective ways to implement the LRP in the Learning by Doing log. The outcomes tracked in the Learning by Doing log will be presented as a part of the 2024 Annual Report.

The following are Learning by Doing activities from the first six months of 2024:

- Denver Water has implemented a refurbished filter replacement cartridge standard operating procedure (SOP) at Aeronet with 120Water and Clorox. When a Denver Water customer returns a replacement cartridge to Aeronet, the replacement cartridge itself is often intact, but the box may be damaged or not suitable to send to a new customer. This SOP helps cut down on wasted replacement cartridges, allowing Denver Water to use cartridges that had damaged boxes but remained perfectly functional and safe for use.
- Denver Water has encountered lower lead replacement rates than anticipated in select work areas in the first six months of 2024. The schedule of subsequent task orders therefore was adjusted to accommodate the lower replacement rates observed. For example, a work area was moved up in the schedule by two months to allow contractors to continue working without a break in the schedule. A contingency area was also planned to be included in the 2024 work plan. Denver Water is still on track to meet its 4,477 annual lead service line replacements.

Efforts continue to use the Learning by Doing approach to address challenges and improve effectiveness of outreach in hard-to-reach communities.