DENVER WATER LEAD REDUCTION PROGRAM

ANNUAL REPORT – 2024

Version 1.0: February 7, 2025

Presented by: Denver Water

DENVER WATER

ISSUE AND REVISION RECORD

Version	Date	Originator	Checker	Approver	Description
1	2/7/2025	LRP Team	Erika Bender	Alexis Woodrow	Formal submission

Document ID: D6NRSJ2KNU6T-1621808796-1744

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Appendix LSL-6	Addresses and Types of Replacements (Second Six-Month Period of 2024)
Appendix LSL-7	LSL Replacement Refusal List (Second Six-Month Period of 2024)
Appendix LSL-8	Properties with a Partial Replacement (Cumulative since Program Inception)
Appendix LSL-9	Addresses and Types of Replacements for Properties Not Previously Counted and Duplicates (Since Program Inception)
Appendix LSL-10	Ownership Changes for Properties on the Refusal List (Second Six-Month Period of 2024)
Appendix LSL-11	Predictive Model Galvanized Approach Technical Memorandum
Appendix FIL-9	Filter Program Opt-Outs (Second Six-Month Period of 2024)
Appendix FIL-10	Filter Program Refusals (Second Six-Month Period of 2024)
Appendix FIL-11	Confirmation of Filter Performance in Field Results (Second Six-Month Period of 2024)
Appendix FIL-12	Occupancy Changes – COE Distribution (Second Six-Month Period of 2024)
Appendix FIL-13	Occupancy Changes – Pitcher Filter Distribution (Second Six-Month Period of 2024)
Appendix FIL-14	Informal Filter Adoption Survey Results Summary (Second Six-Month Period of 2024)
Appendix FIL-15	Informal Filter Adoption Survey Detailed Responses (Second Six-Month Period of 2024)
Appendix COE-12	2025 COE Plan
Appendix COE-13	LCRR Annual Notification Letters
Appendix COE-14	Post-Replacement Follow Up Check In Postcard
Appendix COE-15	Notification Letter Confirming No Lead to Non-LRP Customers
Appendix COE-16	Virtual Community Meeting Email Invitations
Appendix COE-17	Filter Use Reminder Postcard
Appendix COE-18	Program Removal Mailing List (p-Value Changes)
Appendix COE-19	Subscriber Emails (September and December)
Appendix COE-20	Paid Media Reports
Appendix COE-21	Earned Media Reports
Appendix COE-22	TAP Stories Published
Appendix COE-23	Website Traffic
Appendix HEJ-2	2025 ALSLR and FFLSLP Prioritization
Appendix HEJ-3	Ambassador Program Spanish Language Articles

LIST OF ACRONYMS

µg/L	Micrograms per liter
mg/L	Milligrams per liter
ALSLR	Accelerated Lead Service Line Replacement
ALSLR Plan	Planned replacements (regardless of funding source)
CASS	Coding Accuracy Support System
CCT	Corrosion control treatment
CDPHE	Colorado Department of Public Health and Environment
COE	Communications, Outreach and Education
DPS	Denver Public Schools
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
LCRR	Lead and Copper Rule Revisions
LIMS	Laboratory Information Management System
LRP	Lead Reduction Program
LRPP	Lead Reduction Program Plan
LSL	Lead service line
LSLR	Lead service line replacement
MSLMV	Minimum Service Line Material Verification
NSF	National Sanitation Foundation
OCCT	Optimal corrosion control treatment
Order	Variance Order
QA/QC	Quality Assurance / Quality Control
SLID	Service Line Identification
T&D	Transmission and Distribution
WTP	Water Treatment Plant

EXECUTIVE SUMMARY

The Annual Program Year Report presents the comprehensive evaluation of the Lead Reduction Program (LRP) performance to date using the equivalency model described in the Lead Reduction Program Plan (LRPP). As required by the Variance, the comprehensive evaluation uses model inputs based on actual implementation from Jan. 1, 2020, through Dec. 31, 2024. This Annual Program Year Report also includes an assessment of the metrics that were achieved during calendar year 2024.

All performance metrics required in the Variance have been achieved or exceeded:

- Results from lead sampling indicate that lead levels continue to decline at both lead service line homes and copper plumbing with lead solder homes with pH 8.8 ± 0.3 in the distribution system. The 90th percentile lead levels continued to be measured less than 5 µg/L in 2024.

TABLE ES-1. CCT PERFORMANCE BASED ON OVERALL 90TH PERCENTILE LEAD CONCENTRATION

LCR Six Month Sampling Period	2019	2020	2021	2022	2023	2024
Spring Overall 90th Percentile Lead Concentration (µg/L)	10.0	6.7	4.1	3.9	3.6	4.0[1]
Fall Overall 90th Percentile Lead Concentration (µg/L)	11.0	4.4	4.4	3.8	3.9	3.6[2]

[1] See letter from CDPHE dated July 24, 2024.
[2] See revised letter from CDPHE dated Feb. 6, 2025.

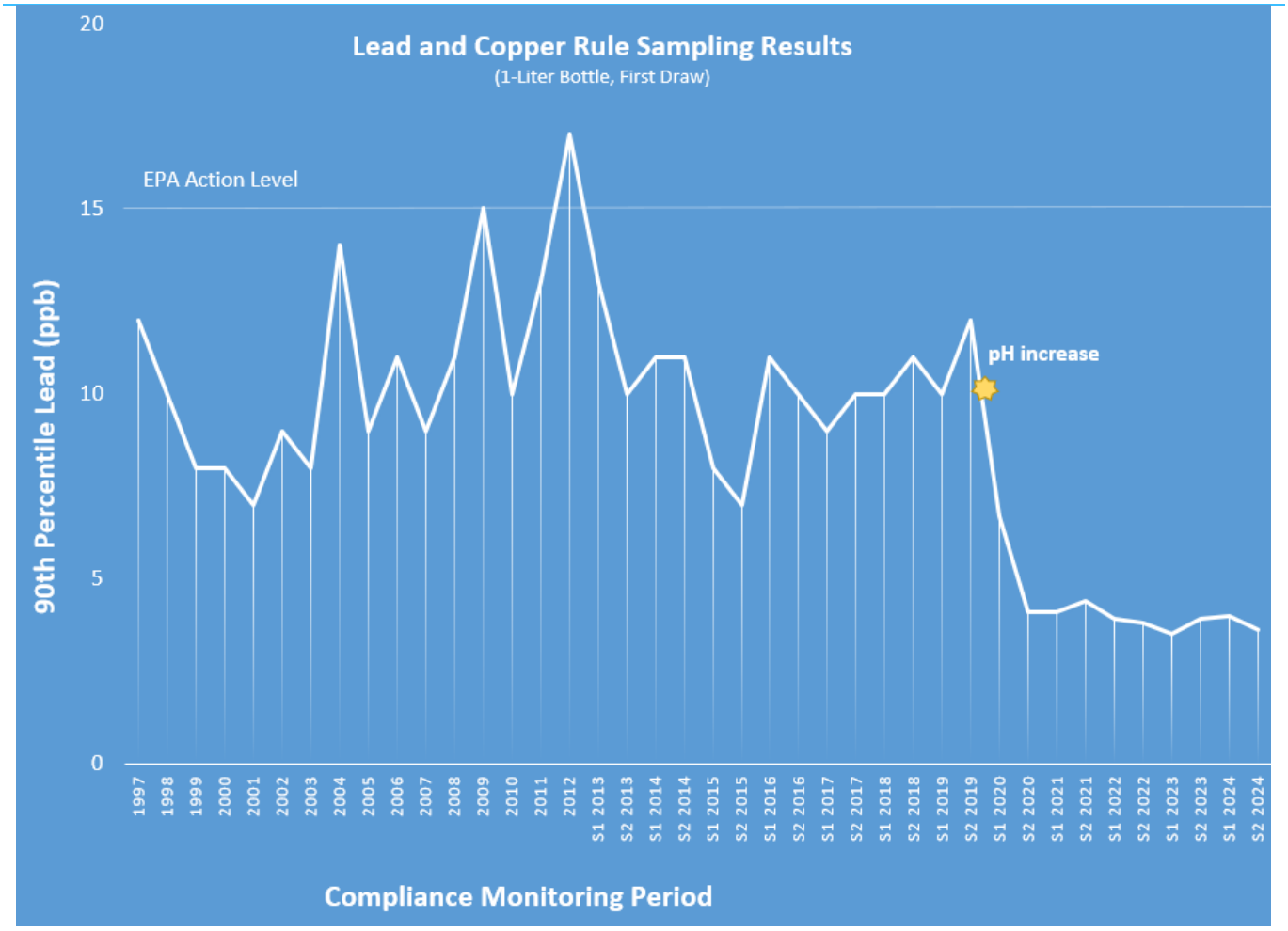

FIGURE ES-1. YEAR-OVER-YEAR CCT PERFORMANCE BASED ON OVERALL 90TH PERCENTILE LEAD CONCENTRATION

- By the end of 2024, a total of 7,973 lead service line replacements were completed for program year 2024, making the annual replacement rate 12.5%, the overall cumulative annual replacement rate 9.5% and the cumulative annual replacement rate within health equity and environmental justice areas of concern 10.2%.
- In 2024, the LRP did not conduct a formal filter adoption survey, as the Variance requires the survey every other year. However, the responses from the 2023 bi-annual filter adoption survey suggest that 83% of customers are using their filters for drinking, cooking, and preparing formula if formula-fed infants reside at the household. The next filter adoption survey will occur in 2025.
- Approximately 85% of samples collected from filters in the customers' homes had no measurable lead. All but three samples collected from filters in the customers' homes had lead levels below 3 µg/L.

The equivalency model demonstrates that the holistic approach of the LRP is as effective and efficient as an alternative treatment technique as compared with orthophosphate treatment,

and exceeds performance predicted with orthophosphate. Overall, the performance of the fifth program year (2024) is equal to or better than the performance of the first four program years (2020 through 2023).

The Nov. 30, 2022, Variance (2022 Variance) went into effect on Jan. 1, 2023, and did not change the base inventory of 63,955 estimated LSLs. The 2022 Variance did, however, change the required cumulative annual average investigations from 1,169 (1.4% of likely lead properties) to 2,420 (1.4% of all unknowns).

Denver Water must comply with the terms and conditions of the 2022 Variance as well as all other provisions in the Lead and Copper Rule Revisions (LCRR), including the requirements associated with corrosion control treatment. Therefore, in addition to the efforts to fulfill Variance requirements, Denver Water has submitted an initial LCRR lead service line inventory and sent out customer notifications to ensure compliance with the LCRR when it went into effect on Oct. 16, 2024, by refining the inventory to fit LCRR terminology and description. The inventory and investigations section of this report further expound upon those efforts and the subsequent changes to the inventory.

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.[1] 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.

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 though the removal of all lead service lines (LSLs) within 15 years. To request approval, Denver Water developed a Lead Reduction Program Plan (LRPP)

[1] Note there have been no exceedances of the 90th percentile calculation under the LCR since 2012.

that described how Denver Water planned to implement the LRP if it were approved.[2] 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.[3]

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 (2022 Variance).[4] All references to the Variance throughout this report are for the 2022 Variance, which the Denver Water LRP operates under, as of Jan. 1, 2023.

In December 2019, Denver Water began the process of implementing the LRPP in accordance with EPA's Dec. 16, 2019, Variance (2019 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 2019 Variance in the first three years of the program:

- Results from LCR compliance sampling indicate that lead levels continue to decline.
- 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 end of 2022 with the issuance of the 2022 Variance over 15,000 LSLs had been replaced.
- As part of the Filter Program, all customers who have an unknown 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 over 80%.

This annual report was prepared in compliance with paragraph 7.B of the 2022 Variance and commitments made by Denver Water in the 2019 LRPP. This report addresses the second six months of 2024 for the period of July 1, 2024, through Dec. 31, 2024, as well as the program year as a whole.

The following plans are referenced throughout this report:

[2] 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.
[3] See Denver Water's 2019 Variance for more details.
[4] See Denver Water's 2022 Variance for more details.

- 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. 9, 2024, alongside the 2023 Annual Report)
- Elevated Lead Response Plan (re-submitted July 6, 2021)
- Corrosion Control Treatment 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 2022 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 shown for 2024, with details for the second six-month period of July 1, 2024, through Dec. 31, 2024, with the exception to provide additional information not included in previous reports.

TABLE 1. WHAT TO EXPECT IN THIS REPORT

Paragraph (and LRP Task)	What to Expect in this Annual Report and Status
7.B.i CCT	This section includes a summary of CCT results for the second six months of 2024.
7.B.ii LSL Inventory	Denver Water first published the LSL Inventory on its website on March 5, 2020. The map was updated on the Denver Water website on Jan. 22, 2025, using data current up to Dec. 31, 2024.
7.B.iii LSL Replacements (aka ALSLR Program)	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.
7.B.iv Filters (aka Filter Program)	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.
7.B.v Compliance Metrics	The Equivalency Model is updated using data collected for the program year.
7.B.vi Communications, Outreach and Education	This section describes implementation of the 2024 COE Plan,[1] virtual community meetings, engagement with the Stakeholder Advisory Committee, and development of new customer resources and materials.
7.B.vii Health Equity and Environmental Justice	This section summarizes implementation of the 2024 COE Plan including updates on activities to support increased equity, community partnerships and outreach.
Paragraph 7.C of the Variance Order	This Annual Report contains a summary of the information and data for the previous Program Year, including an assessment of which metrics were achieved. The Annual Report also provides a comprehensive evaluation of LRPP performance to date using the equivalency model described in the LRPP with updated inputs based on actual LRPP implementation for: • 90th percentile lead levels at LSL and copper plumbing with lead solder sites after operation of increased pH and alkalinity adjustment as CCT. • Number of LSL replacements conducted. • Filter adoption rate. • Filter performance in the field.
Deviations (7.C)	This section documents deviations from the LRPP during the 2024 Program Year.
Appendices	Appendices include CCT, LSL inventory, water quality results, LSL replacements, customer refusal lists, COE and HE&EJ.

[1] See Appendix COE-14 2024 COE Plan in the 2023 Annual Report (submitted Feb. 9, 2024).

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

Description	Annual Program Year Report (2024)
LCR 90th Percentile Lead Concentration based on Compliance and Customer Requested Samples	All LCR compliance samples collected from July 1 to Dec. 31 All customer requested samples reported in LIMS[1] between July 1 and Dec. 31
Elevated Lead Response Reporting	July 1 to Dec. 31[2]
Water Quality Sampling from Select Households (1983 to 1987 Homes)	July 1 to Dec. 31
Inventory – Posting of Map to Denver Water's Website	Data through Dec. 31, 2024 Posted Jan. 22, 2025
Inventory – Update	July 1 to Dec. 31
Investigations – Verification Potholing as Part of ALSLR Program	July 1 to Dec. 31
Investigations – Investigative Potholing Independent of ALSLR Program	July 1 to Dec. 31
Investigations – Water Quality Sampling as part of ALSLR Program (not included in 90th Percentile Calculation)	All results reported in LIMS by Dec. 31
Investigations – Water Quality Sampling Independent of ALSLR Program (not included in 90th Percentile Calculation)	All results reported in LIMS by Dec. 31
Water Quality Sampling Post-LSL Replacement	All results reported in LIMS by Dec. 31
ALSLR Program Replacements	July 1 to Dec. 31
ALSLR Program Consent Forms	July 1 to Dec. 31
Initial Filter Distribution	July 1 to Dec. 31
Replacement Filter Distribution	July 1 to Dec. 31
Filter Program Occupancy Changes[3]	July 1 to Dec. 31
Informal Filter Adoption Survey as Part of ALSLR Program	July 1 to Dec. 31
Filter Testing in the Field	July 1 to Dec. 31
COE Activities	July 1 to Dec. 31

[1] LIMS is the Laboratory Information Management System used by Denver Water.
[2] For samples collected and reported in LIMS by Dec. 31 and follow-up response by Dec. 31, 2024.
[3] Includes occupancy changes at ALSLR properties by definition.

ASSESSMENT OF METRICS ACHIEVED

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

As required by the Variance, the performance metrics for the six elements of the LRP, including the application of CCT, the development – and regular updates – of the LSL inventory, the replacement of LSLs overall and within HE&EJ areas, and the distribution of filter outreach and education materials, have been achieved. The overall performance of the LRP is evaluated

by modeling performance under the conditions of the Order and comparing it to modeling performance with orthophosphate. The required performance metrics from the Variance are provided in Table 3.

TABLE 3. SUMMARY OF COMPLIANCE METRICS FOR 2024

Paragraph	Description	2024 Results
2.C	**C. Corrosion Control Treatment Metric.** 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 CaCO3; for distribution location, pH must fall within a range of 8.5 to 9.1 and a minimum of 20 mg/L as CaCO3. CDPHE may modify these required water quality parameters through a modification decision under 5 CCR 1001-11.26(3)(d)(ii).	**Achieved.**
3.D	**D. LSL Inventory Compliance Metric.** Investigate a cumulative average of 1.4% of the total estimated number of unknown service lines in the inventory each Program Year from Jan. 1, 2020, to the Variance End Date. These investigations are performed independently of the LSL replacements.	**Achieved.** Investigated 17,962 service lines independently of the 2024 ALSLR Program.
4.I	**I. Accelerated LSL Replacement Compliance Metric.** Annually achieve at least a 7.0% cumulative average Program Year LSL replacement rate as determined based on reporting required in paragraph 7.B.	**Achieved.** Completed 7,973 LSL replacements in 2024.
5.G	**G. Filter Communication Compliance Metric.** 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.	**Achieved.** Provided outreach and education materials to over 95% of all customers enrolled in the Filter Program.
6.B	**B. Comprehensive LRPP Performance Metric.** 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.	**Achieved.** See this report for the model output demonstrating that the LRP is more efficient than orthophosphate treatment.
6.C	**C. Health Equity and Environmental Justice (HE and EJ) Compliance Metric.** 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. Denver Water must also 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.	**Achieved.** Completed 4,092 LSL replacements in HE&EJ areas in 2024, equating to a 10.2% cumulative replacement rate. Provided outreach and education materials to over 95% of customers as identified in HE&EJ areas enrolled in the Filter Program.

Performance Dashboard

Denver Water uses a dashboard to communicate key metrics to share the progress of the LRP with the public. The below dashboard will be posted on Denver Water's website upon submittal of this report, in both English and Spanish, and will show data through Dec. 31, 2024.[5] 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.[6] 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).

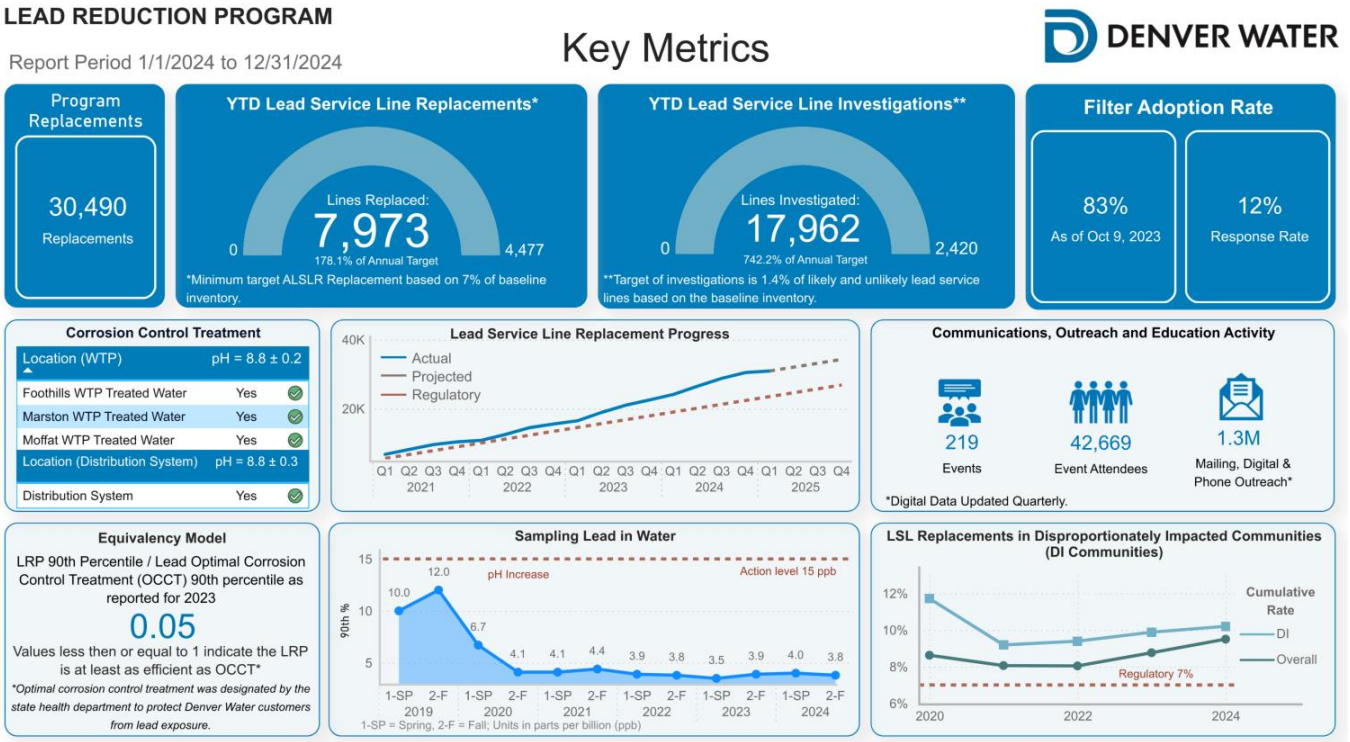

FIGURE 1. DASHBOARD AS POSTED TO THE DENVER WATER WEBSITE (DATA TO DEC. 31, 2024)

[5] See the 2020 Second Quarterly Report for an explanation of the metrics used in the dashboard.
[6] 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 2022 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. 90th 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 2022 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 offered 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. In addition to the information presented in this report, Denver Water also

submitted several miscellaneous reports to CDPHE and EPA as required in the LRPP and described in Table 4.

TABLE 4. OVERVIEW OF 7.B.I REQUIREMENTS

Paragraph Reference	Description	Refer to
7.B.i.a	Notify CDPHE of elevated lead levels and actions taken by Denver Water to reduce lead exposure.	See Table 5 and Appendix.[1]
7.B.i.b	Lead sampling results per the Lead and Copper Rule and from customer requested sampling.	See Table 7 (90th percentile to date).
LRPP III.E (p 70)	Monthly trending of LCR compliance samples and customer requested samples.	See Table 5.
7.B.i.c	90th percentile lead levels for LSLs and for copper with lead solder sites.	See Table 7.
7.B.i.d	CCT parameters for pH and alkalinity, reported monthly.	See Table 8.
LRPP III.E (p 70)	Install automated pH control loops at all three treatment plants by March 2020.	All three plants have feedback loops in place and are functioning.
7.B.i.e	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 90th percentile lead concentration.	See Table 10 and Table 11.
LRPP Executive Summary LRPP III.E (p 65)	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.
LRPP III.E (p 71)	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.
Voluntary	Results from continued operation of the pipe racks.	Submitted Feb. 16, 2022.

[1] See Appendix CCT-5 Summary of Response to Elevated Lead Levels (Second Six-Month Period of 2024).

Water quality testing is a simple and effective 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 (pre-LSLR, post-LSLR, customer-requested) 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 3-bottle test for customer-requested and investigative water quality sampling under the 2022 Variance for consistency with past practices, as the 3-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 Dec. 31, 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.

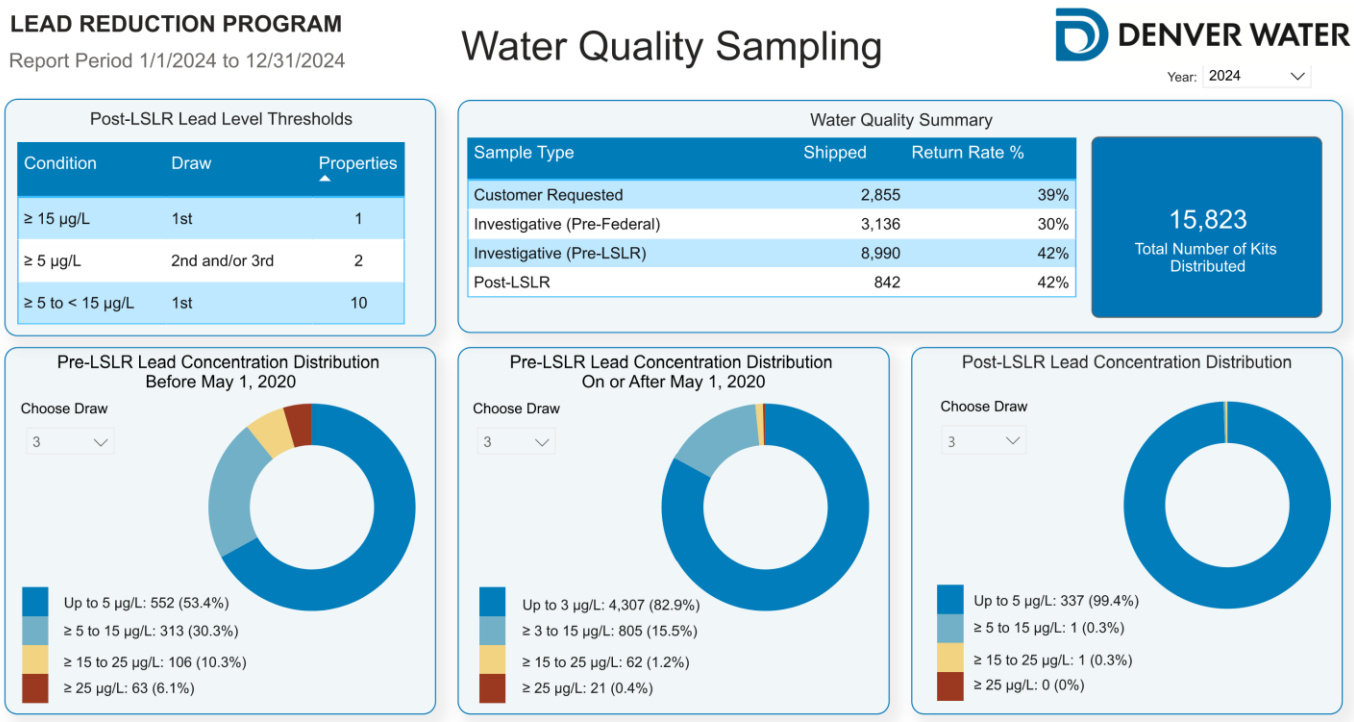

FIGURE 2. WATER QUALITY SAMPLING DASHBOARD

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 2022 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 but will transition to fifth-liter (5-L) sampling in 2027 to meet the requirements of the LCRI.[7]

All customer-requested samples with first draw concentrations above 25 µg/L analyzed by month during the second half of 2024 are listed in Table 5.[8] 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.[9] Lead was measured above 25 µg/L in eight samples during the second six month reporting period for 2024.

TABLE 5. COUNT OF PROPERTIES WITH ELEVATED LEAD CONCENTRATIONS IN LCR AND CUSTOMER REQUESTED SAMPLES[1]

Description (Based on Sampling Date)	July 2024	August 2024	September 2024	October 2024	November 2024	December 2024	Response
Properties with Lead >25 µg/L in first 1 L sample bottle	1	3	0	4	0	0	See Appendix.[2]

[1] 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-5, Summary of Response to Elevated Lead Levels (Second Six-Month Period of 2024) per the definition used in the 2022 Variance. Data reflect samples analyzed by Dec. 31, 2024.

[2] See Appendix CCT-5 Summary of Response to Elevated Lead Levels (Second Six-Month Period of 2024).

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

Per Section 7.B.i.b and 7.B.i.c of the 2022 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

[7] See EPA's Lead and Copper Rule Improvements for more details on sampling methods.
[8] See Appendix CCT-5 Summary of Response to Elevated Lead Levels (Second Six-Month Period of 2024) for elevated lead measured in the first bottle of the 3-bottle test.
[9] 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 6. 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 6. 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[1]	Fall[2]
Overall 90th Percentile	10	11.8	6.7	4.1	4.1	4.3	3.9	3.8	3.6	3.9	4.0	3.6
LSL 90th Percentile	10	12.4	6.7	4.3	4.1	4.5	4.0	3.9	3.4	3.6	3.8	3.7
CPLS 90th Percentile	7.8	5.1	4.8	2.9	3.4	2.3	1.2	1.7	1.8	1.7	1.1	1.3

[1] The 90th percentile Spring 2024 overall lead concentration as approved by CDPHE in their July 24, 2024, letter.
[2] The 90th percentile Fall 2024 overall lead concentration as approved by CDPHE in their Jan. 31, 2025, letter.

Results from customer-requested sampling are included in the overall 90th percentile lead concentration reported in Table 7.

TABLE 7. SUMMARY OF LCR 90TH PERCENTILE LEAD CONCENTRATIONS (JULY 1 TO DEC. 31, 2024)

LCR Compliance Results for Lead	Fall 2024 Compliance Period[1]	Result	Number of Homes
LCR Compliance 90th Percentile Lead[2]		3.7 µg/L	130
Overall 90th Percentile Lead Concentration using LCR Compliance + Customer Requested Samples[3]		3.6 µg/L	780 (130+ 650)

[1] The 90th percentile Fall 2024 lead concentration as approved by CDPHE in their Jan. 31, 2025, letter.
[2] 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 July 1 to Dec. 31, 2024, compliance period.
[3] Includes results from customer-requested samples reported in LIMS between July 1 and Dec. 31, 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 2022 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 8 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 9 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 ± 0.2 for pH in treated water, 8.8 ± 0.3 for pH in the distribution system, and alkalinity greater than or equal to 20 mg/L as $CaCO_3$, all effective July 1, 2021.

TABLE 8. MINIMUM DAILY AVERAGE PH REPORTED EACH MONTH

Description	July 2024	August 2024	Sept 2024	Oct 2024	Nov 2024	Dec 2024
Effluent Variance Requirement	pH 8.8 +/- 0.2 in WTP effluent					
Marston Water Treatment Plant Effluent[1]	8.86	8.87	8.84	8.84	8.83	8.82
Foothills Water Treatment Plant Effluent[2]	8.82	8.82	8.83	-	-	-
Moffat Water Treatment Plant Effluent	8.84	8.84	8.85	-	-	-
Northwater Treatment Plant Effluent	-	-	-	8.88	8.79	8.80
Distribution System Variance Requirement	pH 8.8 +/- 0.3 in distribution system					
Distribution System	pH levels in the distribution have been within 8.8 +/- 0.3 since March 12, 2020.					

[1] The Moffat Water Treatment Plant went offline on Sept. 10, 2024, for decommissioning in conjunction of Northwater Treatment turning online October 2, 2024.
[2] The Foothills Water Treatment Plant went offline on Oct. 29, 2024, for repairs to Conduit 28 maintenance.

TABLE 9. MINIMUM DAILY AVERAGE ALKALINITY REPORTED EACH MONTH

Description	July 2024	August 2024	Sept 2024	Oct 2024	Nov 2024	Dec 2024
Effluent Variance Requirement	≥ 20 mg/L as $CaCO_3$					
Marston Water Treatment Plant Effluent[1]	64.7	50.5	56.3	60.6	65.6	68.8
Foothills Water Treatment Plant Effluent[2]	60.6	51.0	56.2	-	-	-
Moffat Water Treatment Plant Effluent	44.4	44.3	45.1	-	-	-
Northwater Treatment Plant Effluent	-	-	-	48.5	49.2	50.8

[1] The Moffat Water Treatment Plant went offline on Sept. 10, 2024, for decommissioning in conjunction of Northwater Treatment turning online Oct. 2, 2024.
[2] The Foothills Water Treatment Plant went offline on October 29, 2024, for repairs to Conduit 28 maintenance.

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

Per Section 7.B.i.e of the 2022 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).[10] The 3-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:[11]

- 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 < 1).[12]
- To inform the inventory and predictive model at properties in the City and County of Denver and in distributor areas with an unknown unlikely and unknown likely LSL (i.e., p-value ≥ 0.01 and ≤ 0.9). In 2024, water quality efforts were expanded in strategic locations to include customers with p-values below 0.5 to help with the continued refinement and training of the predictive model.
- 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 triggers a review of inclusion in the LRP, and the property is added to the list for LSL replacement and added to the Filter Program if not already enrolled.[13] A summary of the water quality results prior to LSL replacements is presented in Table 10. The maximum lead concentration measured year-to-date was 2,140 µg/L. This result occurred in the first bottle of samples collected at a single-family property in May 2024. This is a result of a three-week stagnation period, coupled with the samples being taken from the meter pit. There is currently no internal plumbing due to remodeling of the entire home and is vacant. They do not expect to have plumbing put in for a few months and the owner lives out of state. The lead service line at this property was replaced in December 2024. Multi-family residences with five or more units that request a water quality kit are sent a 1-bottle sampling kit and are included in Table 10.

[10] See Section 7.B.ii LSL Inventory for more details.
[11] Details and results for pre-LSL replacement sampling efforts can be provided upon request.
[12] Since July 22, 2020, kits are sent to all properties with a p-value of 0.5 to 0.9. Any property with a p-value < 1 is verified in the field before replacement, using visual inspection of materials at the interior connection and/or potholing on the exterior.
[13] 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 about 3 µg/L are considered lead. Samples collected prior to May 1, 2020, are assessed using the original threshold of 5 µg/L.

TABLE 10. SUMMARY OF WATER QUALITY RESULTS PRE-LSL REPLACEMENT AT SINGLE-FAMILY RESIDENCES USING THE 3-BOTTLE TEST

Water Quality Sampling for Investigation (pre LSL Replacement)	Count	Unit
Total Number of Kits Mailed Out from July 1 to Dec. 31, 2024[1]	4,972	Kits
Total Number of Kits Received and Analyzed to Investigate the Service Line Material from July 1 to Dec. 31, 2024[2]	1,590	Kits
Maximum Lead Concentration Measured Year-to-Date	2,140	µg/L
Average Lead Concentration from July 1 to Dec. 31, 2024 (in second and third bottles only)[3]	1.31	µg/L

[1] 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 431 1-Bottle kits.

[2] As reported in LIMS by Dec. 31, 2024.

[3] 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 2022 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 three months after LSL replacement to single-family, multi-family 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 3-bottle sampling kit approximately three months after replacement and multi-family 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 multi-family building.

For LSL replacements completed after Jan. 1, 2021, all single-family, multi-family, and commercial properties receive an offer letter for post-LSL replacement sampling approximately three months after LSL replacement.[14] Per the 2022 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. The offer is sent via postcard and includes a QR code to increase the ease of requesting a kit. If the customer elects to participate, single-family properties receive a 3-bottle sampling kit and multi-family and commercial properties receive a 1-bottle sampling kit. A summary of post-LSL replacement sampling offers is provided in Table 11. As of July 2021, only those single-family properties with replacements

[14] See Appendix CCT-6 Post LSL Replacement Sampling – Summary of Completed Offer to Test (Cumulative since LRP Inception).

completed by Denver Water crews automatically receive a 3-bottle sampling kit, with offer letters continuing to be mailed to all other residential multi-family and commercial properties.

As of May 2024, single-family properties with replacements completed by Denver Water crews will receive offer letters instead of automatically mailing a 3-bottle sampling kit, with offer letters continuing to be mailed to all other residential multifamily and commercial properties.

TABLE 11. SUMMARY OF POST-REPLACEMENT SAMPLING OFFERS AND WATER QUALITY (JULY 1 THROUGH DEC. 31, 2024)

Water Quality Sampling after LSL Replacement	Count[1]						
	July 2024	Aug 2024	Sept 2024	Oct 2024	Nov 2024	Dec 2024	TOTAL
Total Number of Letters Mailed to Offer Post-LSL Replacement Sampling[2,3,4]	1,317	1,312	0	1,064	1,000	871	5,564
Total Number of Kits Mailed Out[2,3]	20	35	21	100	34	16	226
Total Number of Kits Received and Analyzed to Confirm post-LSL Replacement Water Quality[2,5]	20	19	14	15	17	0	85
Number of Properties with Lead > 15 µg/L in First Bottle[2] (triggers additional investigation effort)	0	0	0	0	0	0	0
Number of Properties with Lead ≥ 5 and < 15 µg/L in the Second and/or Third Bottle[2] (triggers additional investigation effort)	0	0	1	0	0	0	1
Number of Properties with Lead ≥ 5 and < 15 µg/L in First Bottle[2,7] (triggers customer education)	2	1	0	0	2	0	4
Total Number of Kits Received and Analyzed to Confirm post-LSL Replacement Water Quality Not Previously Reported[6]	34						

[1] Counts are based on the month of sample collection, per the 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.

[2] Applies to single-family and multi-family residences.

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

[4] The post-replacement offer letters were ordered in September; however, they did not get mailed out until October.

[5] Total number of kits analyzed refers to results available in LIMS by Dec. 31, 2024, with samples collected since July 1, 2024.

[6] Two results from Aug 2022, two results from Nov 2023, eight results from Dec 2023, three results from May 2024, and nineteen results from June 2024 (added to count for July) not previously reported.

[7] One result from June 2024 not previously reported.

During this reporting period, six properties with a completed LSL replacement 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 complete. Once the data are reconciled, a water quality sampling kit or offer letter is sent to these properties. All properties 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-7, including follow-up activities.[15]

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[16] 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 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 2022 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. Information on this offer is available on the Denver Water website. In the second six months of 2024, five water quality sampling results were analyzed for select households, none 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.[17]

5th L Sample Collection

During the Fall 2024 LCR compliance sampling round, technicians collected five 1 L sequential samples at 87 properties with an LSL included in the LCR study pool in preparation for new sampling protocols described in the EPA’s LCRI published in October 2024. Results are shown in Table 12. Lead was measured less than 1 µg/L in the 5th L at 22 properties, most of

[15] See Appendix CCT-7 Post LSL Replacement Sampling – Summary of Incomplete Offer to Test (Cumulative since LRP Inception).

[16] 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.

[17] See Appendix CCT-8 Summary of Water Quality Sampling Results from Select Households (1983 to 1987 Homes, Cumulative since LRP Inception).

which also measured less than 1 µg/L in the first draw. The results of Table 12 were compared to results described in the LRPP which included sampling using ten 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. Two homes had concentrations as high as 15 µg/L in the fifth draw (15.6 and 16.1 µg/L) and seven homes 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.

TABLE 12. OVERVIEW OF 5TH LITER SAMPLING DATA IN FALL 2024

5th L Sampling in 2023	Count
Total Number of Properties Sampled for 5th L	87
Number of Properties with inconclusive data (all results <1.0)	22
Number of Properties where the 5th L < 1st L concentration	79
Number of Properties where the 5th L > 1st L concentration	8

7.B.ii LSL Inventory

Section 7.B.ii of the 2022 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 2022 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 submitted an initial LCRR lead service line inventory to ensure compliance with the LCRR when it went into effect on Oct. 16, 2024, by refining the inventory to fit LCRR terminology and description. This section of this report further expands upon those efforts and the subsequent changes to the inventory.

An overview of the LSL Inventory reporting requirements is shown in Table 13.

TABLE 13. OVERVIEW OF 7.B.II REQUIREMENTS

Paragraph Reference	Description	Refer to
3.A	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 15. Submitted.
3.C	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 was updated to list by specific street address which service lines are lead, galvanized requiring replacement, non-lead, or lead status unknown.	Re-posted on Jan. 22, 2025, using data through Dec. 31, 2024. Complete.
7.B.ii.a.1	Total number of LSLs and GRR.	Refer to Table 15. See Appendix.[1]
7.B.ii.a.2	Total number of replaced LSLs during the Variance.	Refer to Table 16.
7.B.ii.a.3	Total number of confirmed and likely LSLs.	Refer to Table 15.
7.B.ii.a.4	Total number of unlikely LSLs.	Refer to Table 15.
7.B.ii.a.5	Total number of non-LSLs. Total number of non-LSLs determined solely by statistical methods.	Refer to Table 15. Described after Table 15.
7.B.ii.b **3B, 3.D**	Number of investigations that supports 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 22.
LRPP III.B (p 51)	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 as well as refine the LSLI.	See Section 7.B.vii.
7.B.ii.c	Updated LSL Inventory Map.	https://www.denverwater.org/your-water/water-quality/lead
7.B.ii.d	Rationale for change to status of the service line in the LSL Inventory.	See Appendix.[2]

[1] See Appendix INV-5 Summary of Service Line Status and p-Value (Second Six-Month Period of 2024).

[2] See Appendices INV-6A Line by Line p-Value Changes: Status Descriptions and Notes (Second Six-Month Period of 2024) and INV-6B Line by Line p-Value Changes by Status (Second 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 15).[18] The initial LSL inventory designating known, suspected, and possible LSLs was subsequently submitted on Feb. 5, 2020.

Table 14 below details the terminology used for various submittals of the lead service line inventory under the LRP.

[18] See the September 2019 LRPP for more information.

TABLE 14. LEAD SERVICE LINE INVENTORY SUBMITTALS

Naming	Submittal Date	Notes
Baseline Inventory	September 2019	Included in the Denver Water proposed Lead Reduction Program Plan (LRPP).[1] This inventory serves as the basis for the 63,955 LSL estimate and the 7% replacement rate.
Initial Inventory	February 2020	Provided an initial inventory within 35 days of the effective date of the 2019 Variance, per paragraph 3.A.[2]
Annual Inventory	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.
LCRR Inventory	October 2024	Note that although the LCRR refers to this submittal as the initial inventory, the LRP has an established initial inventory and therefore the program will refer to this submittal as the LCRR inventory.

[1] Refer to the September 2019 LRPP for more information.

[2] Refer to the 2019 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, and
- 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 quarterly.[19] Large changes to the inventory occurred in 2023 and 2024 due to investigations and are described in the investigation section of this report. Beginning in October 2024, the program

[19] See Denver Water's online map for more information.

shifted to the terminology defined in the LCRR, grouping likely (possible and suspected LSL) and unlikely into unknowns.

Figure 3 below shows the inventory dashboard, as of Dec. 31, 2024. The theme of the dashboard below is to demonstrate where the program started and where it is today. 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 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.

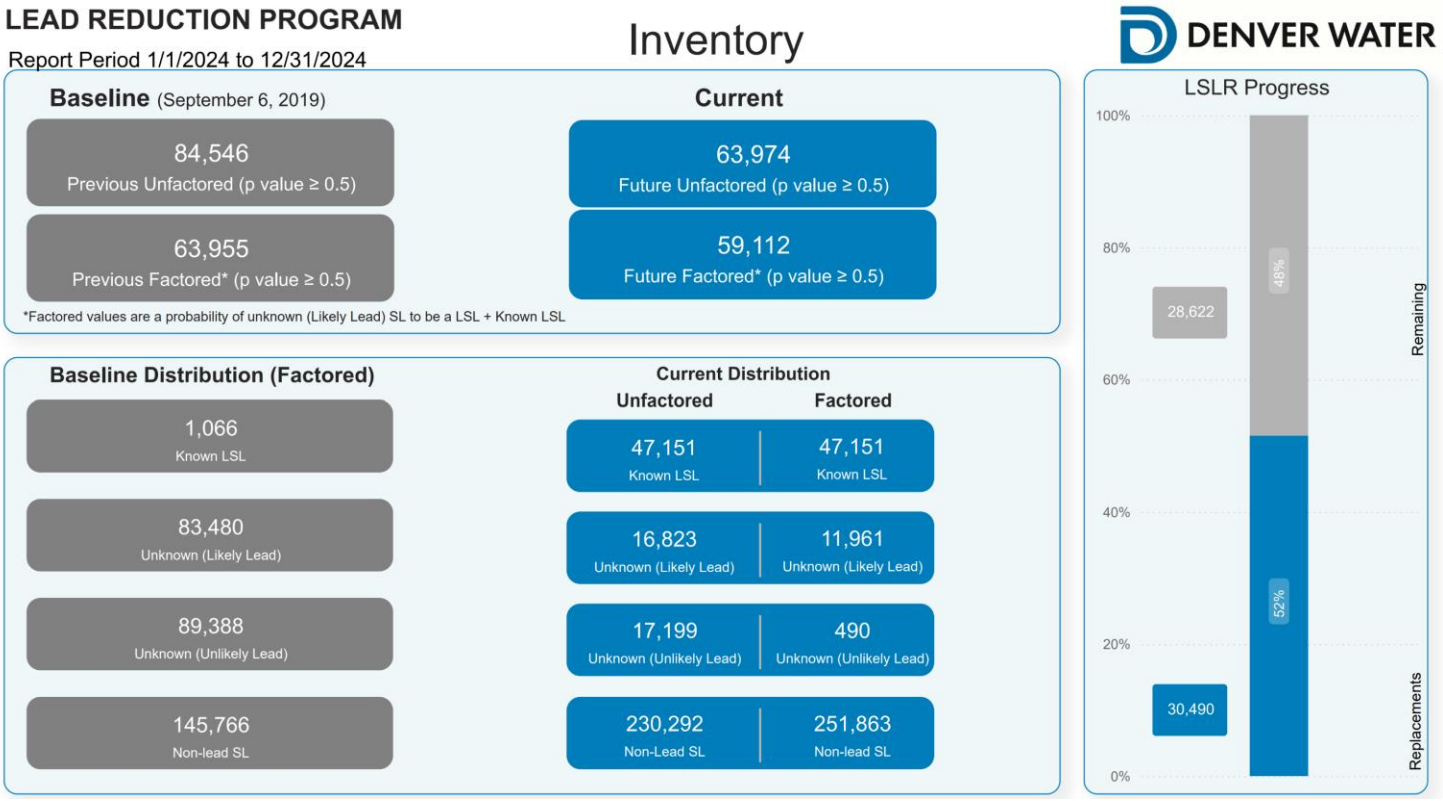

FIGURE 3. INVENTORY DASHBOARD

The information presented in Table 15 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 15,

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 15, the program has confirmed 40,845 LSLs with an additional subset of 6,306 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 6,306 service lines classified as GRR in Table 15 represent those galvanized service lines where lead was not found. Ongoing investigations have shown that 6,007 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. In 2025, Denver Water plans to expand the means and methods of identifying GRRs, using additional investigation methods, such as 9-L water quality sampling and x-ray fluorescence technology, combined with the predictive model.[20] The expanded approach will be coordinated with regulators prior to program implementation.

[20] See Appendix LSL-11 Predictive Model Galvanized Approach Technical Memorandum for further details.

TABLE 15. LEAD SERVICE LINE INVENTORY AS OF DEC. 31, 2024

Status of Service Line	Sept. 6, 2019 Submittal (Aug. 8, 2019 Data) BASELINE INVENTORY	Feb. 5, 2020 Submittal (Jan. 28, 2020 Data) INITIAL INVENTORY	Feb. 9, 2024 Submittal (Dec. 31, 2023 Data) 2023 ANNUAL INVENTORY	Feb. 10, 2025 Submittal (Dec. 31, 2024 Data) CURRENT INVENTORY[1]
Confirmed LSL[2] *(previously referred to as Known Lead)*	1,066	1,149	32,864	40,845
GRR[3]	*(Included with Confirmed LSL count)*		2,760	6,306
Unknown Likely LSL *(Suspected Lead + Possible Lead)*	83,480	82,337	34,964	16,823
Unknown Unlikely LSL	89,388	90,745	31,579	17,199
Non-LSL[4,5]	145,766	146,528	217,292	230,292
Total Number of Services	319,700	320,759	320,753	311,465
TOTAL ESTIMATED Number of Lead Service Lines[6,7]	**63,955**	**63,195**	**62,114**	**59,112**

[1] The "current inventory" is the basis of enrollment in the Filter Program (calculated as the sum of the properties with a confirmed or unknown likely LSL, plus distribution of additional filters to multiple units at the same property and less the number of vacant properties).

[2] 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 30,477 properties categorized as "confirmed LSL" in the current inventory were replaced since program inception (see Table 16 and Table 25). Due to ongoing data integration and QC processes, 140 of the 30,477 properties identified as confirmed replacements remain to be integrated into the LRP database to drive a p-value change to 0. Of these 140, two remain as unknown unlikely LSLs, 35 as unknown likely LSLs, 13 as confirmed LSLs, and an additional 90 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.

[3] Previous inventory reporting counted GRRs under the "confirmed LSL" count. GRRs in the Dec. 31, 2024, LSLI include galvanized-galvanized (159 properties), copper-galvanized (6,007 properties), and galvanized-copper (194 properties) service lines. Properties with galvanized (and no lead identified in potholing) with water quality results ≥ 3 µg/L lead are included in this number.

[4] 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.

[5] 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 16), as these are already included in the count for "confirmed LSL."

[6] See Appendix INV-6 Summary of Service Line Status and p-Value (Second Six Month Period of 2024) for details on how this was calculated.

[7] In February 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 230,292 service lines identified as non-lead in the current inventory, 203,059 are included in this category based solely on statistical assumptions (140,574 from the initial September 6, 2019, inventory, 5,248 since identified through desktop evaluation and 57,237 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.[21] Properties built or connected between 1951 and 1971 are considered unknown unlikely LSLs based on historical records and evidence of non-lead materials.[22] 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 July 1 and Dec. 31, 2024, is shown in Table 16. Denver Water does not count the replacement of copper service lines (i.e., non-LSL) toward the total number of LSL replacements for compliance purposes.[23]

TABLE 16. NUMBER OF LSL REPLACEMENTS BETWEEN JULY 1 AND DEC. 31, 2024

Description	Count[1]
Number of LSLs Replaced in July 2024	745
Number of LSLs Replaced in August 2024	698
Number of LSLs Replaced in September 2024	818
Number of LSLs Replaced in October 2024	775
Number of LSLs Replaced in November 2024	434
Number of LSLs Replaced in December 2024	500
Total Number of LSLs Replaced in the Second Six Months of 2024	3,970
Total Number of LSLs Replaced in 2024	7,973
Number of LSLs Replaced not Previously Reported[2]	70
Total Number of LSLs Replaced since inception of LRP on Jan. 1, 2020	30,490

[1] The number of replacements identified in the "Lead Replacement" column of Appendix INV-6B (Line by Line p-Value Changes by Status, Second Six-Month Period of 2024) does not match the number of LSL replacements shown in Table 16 due to a lag in the quality assurance review during data integration from field replacements to LRP database. To validate replacements per month**,** refer to LSL-6 Addresses and Types of Replacements (Second Six-Month Period of 2024).

[2] This includes the net change to the number of LSL replacements completed since program inception not previously reported (70 added) and previously reported LSL replacements that upon review were removed (5 deductions); see Appendix LSL-6 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 2022 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 2022 Variance, Denver Water continues to conduct investigations of service lines and make refinements to the LSL Inventory of service line materials connected to

[21] 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).

[22] See Appendix II.B.2 of the Lead Reduction Program Plan for details and assumptions.

[23] See paragraph 4.B of the Variance Order and the notes for the column "Actual Previous Materials" in Appendix LSL-6 Addresses and Types of Replacements (Second 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.[24]

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 unknown 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.[25]

[24] See Denver Water's Investigations Webpage and the 2022 Variance for more information.

[25] For additional information on the predictive model, see Appendix INV-10 Predictive Model Technical Memorandum from the 2023 Annual Report.

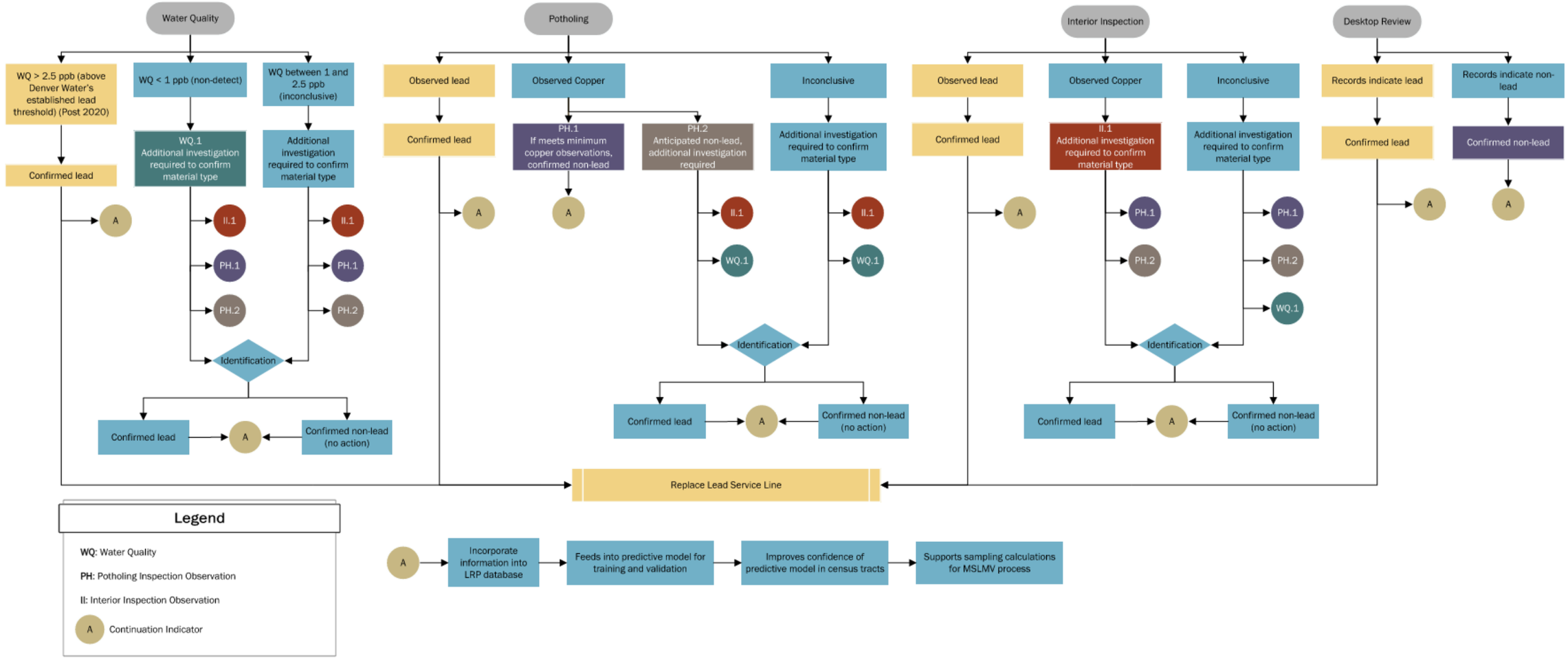

FIGURE 4. INVESTIGATION FLOW DIAGRAM

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 2022 Variance).

2) The investigation was performed independently of LSL replacements (see paragraph 3.D in the 2022 Variance). Visual verifications that result in a copper material designation, and therefore do not result in a replacement, are counted as an investigation.

3) The investigation was not the result of a customer-requested water quality sample (see paragraph 1.L in the 2022 Variance).

Definitions used to categorize the service line material:[26]	
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 *(Unknown Likely)*	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 *(Unknown Unlikely)*	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, and
5) Predictive modeling.

THE

[26] As defined in paragraphs 1.C, 1.P, and 1.X of the Order, 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 Order. The term "unknown" is used for both likely and unlikely lead service lines to meet requirements under the LCRR and is consistent with the terminology used on Denver Water's public inventory.

Figure 5 dashboard below shows the number of investigations counted year-to-date (Jan. 1, 2024, through Dec. 31, 2024) and program-to-date (Jan. 1, 2020, through Dec. 31, 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 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 is provided throughout this section of the report.

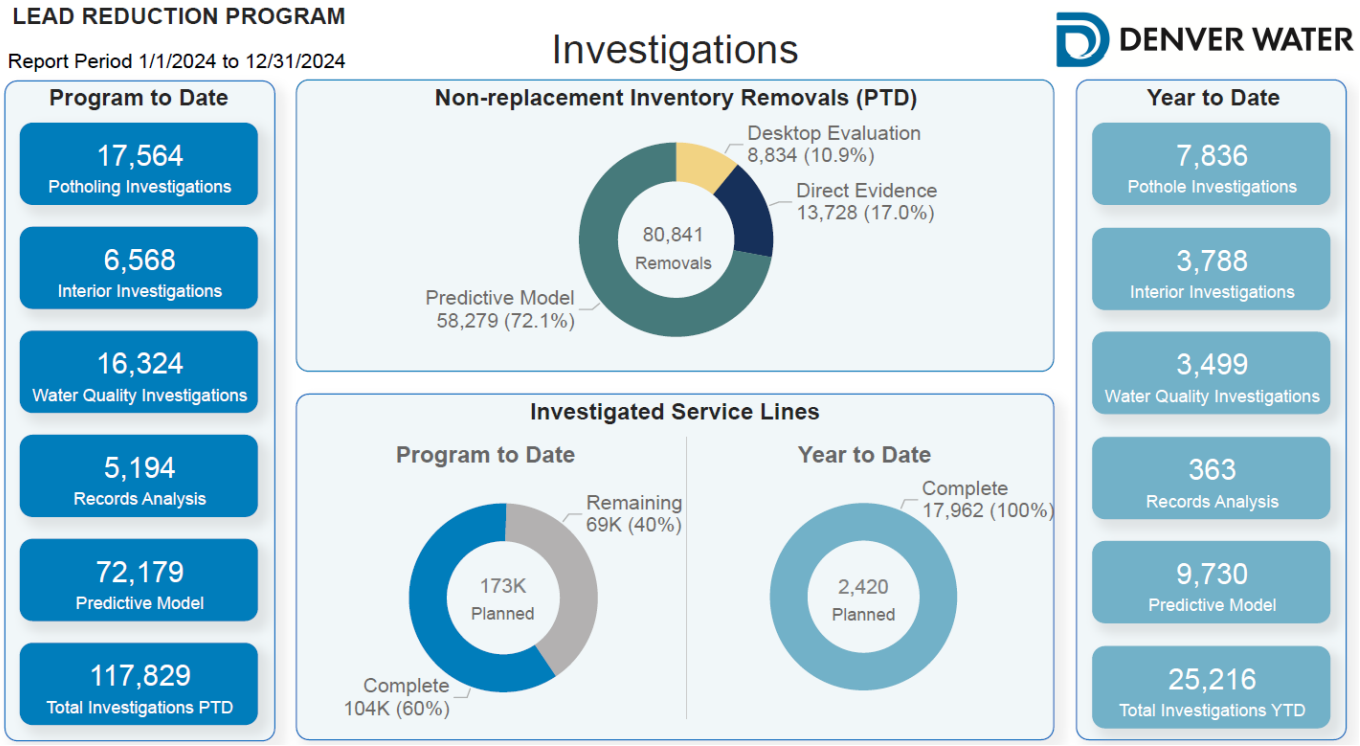

FIGURE 5. INVESTIGATIONS DASHBOARD

SERVICE LINE IDENTIFICATION PROCESS

CDPHE published a Service Line Identification (SLID) Policy on Sept. 7, 2023, that 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 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 2023. With the large number of unknowns in Denver Water's service area, the predictive model drives to refine the inventory (i.e., identify unknown materials), using machine learning, as discussed later in this section. CDPHE's SLID Policy 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 material. Therefore, Denver Water began incorporating the predictive model into the inventory, driving to material designations (p-value changes). P-value changes due to the predictive model are counted toward Denver Water's investigation metric defined by the 2022 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).

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 investigation.

TABLE 17. INTERIOR INSPECTION OBSERVATIONS (JULY 1 TO DEC. 31, 2024)

Service Line Status	Total Number of Investigations	Interior Inspection Observation	Follow up Action
Initial Status 0.5 ≤ p ≤ 0.9	951	Observed lead	Property added to list for LSL replacement and is scheduled to be replaced.
	2,612	Observed non-lead	Additional investigation is required.
	701	Incomplete[1]	Additional investigation is required.
Initial Status 0.01 ≤ p < 0.5	50	Observed lead	Property added to list for LSL replacement and is scheduled to be replaced.
	231	Observed non-lead	Additional investigation is required.
	30	Incomplete[2]	Additional investigation is required.
Total Number of Interior Inspections (Second Six Months Only)[3,4]			**4,681**

[1] Includes 31 customer self-reporting observations of galvanized where additional investigation is still needed to determine galvanized requiring replacement status.
[2] Includes two customer self-reporting observations of galvanized where additional investigation is still needed to determine galvanized requiring replacement status.
[3] Includes 204 interior inspections conducted outside of the ALSLR Plan for investigative purposes.
[4] Includes 106 properties not included in above categories. Of the 106, 52 properties with a February 2020 p-value of 1, 47 properties with a February 2020 p-value of 0, and 7 properties added to the inventory after the February 2020 submittal where an interior inspection was conducted for investigative purposes.

To increase the number of interior investigations performed under the LRP, Denver Water launched a customer self-reporting tool. The tool, which is accessible to all Denver Water customers, guides 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 then undergo review by LRP staff to compare the reported material with photos submitted by the customer. LRP staff confirm that the information and photos submitted by the customer meets the same data requirements of LRP observations. Denver Water staff conduct follow-up coordination with the customer to obtain any missing or deficient information. Submissions that are validated by the review process are incorporated into the lead service line inventory and are counted as an interior inspection.

POTHOLING

Potholing can be used to identify lead status as a stand-alone investigative method or can be used combination with other investigative methods to determine that a property is designated “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-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. Results from potholing as part of the ALSLR Program are presented in Table 18 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 18. POTHOLING OBSERVATIONS AS PART OF THE 2024 ALSLR PLAN (JULY 1 TO DEC. 31, 2024)

Service Line Status	Total Number of Investigations	Pothole Observation	Follow up Action
Initial Status 0.5 ≤ p ≤ 0.9	2,624	Confirmed lead.	Property added to list for LSL replacement and is scheduled to be replaced.
	1,044	Confirmed non-lead.	Remove property from LRP.
	1,185	Incomplete.	Additional investigation is required.
Initial Status 0.01 ≤ p < 0.5	60	Confirmed lead.	Property added to list for LSL replacement and is scheduled to be replaced.
	216	Confirmed non-lead.	Remove property from LRP.
	188	Incomplete.	Additional investigation is required.
Total Number of Properties Potholed within 2024 ALSLR Program (Second Six Months Only)[1]			**5,417**

[1] Includes 100 properties not included in above categories. Of the 100, 54 properties with a February 2020 p-value of 1, 39 properties with a February 2020 p-value of 0, and seven properties added to the inventory after the February 2020 submittal.

During the second six months of 2024, potholing was performed at 2,375 properties not included in the 2024 ALSLR Plan.[27] Results are included in Table 19. If potholing occurred at a critical customer property and lead is found, the property is scheduled for replacement in 2024 and therefore does not contribute to the required number of annual investigations.

TABLE 19. POTHOLING OBSERVATIONS INDEPENDENT OF THE 2024 ALSLR PLAN (JULY 1 TO DEC. 31, 2024)

Service Line Status	Total Number of Investigations	Pothole Observations	Follow up Action
Initial Status 0.5 ≤ p ≤ 0.9	275	Confirmed lead.	Property added to list for LSL replacement and is scheduled to be replaced.
	314	Confirmed non-lead.	Remove property from LRP.
	70	Incomplete.	Additional investigation is required.
Initial Status[1] 0.01 ≤ p < 0.5	13	Confirmed lead.	Property added to list for LSL replacement and is scheduled to be replaced.
	177	Confirmed non-lead.	Remove property from LRP.
	36	Incomplete.	Additional investigation is required.
Total Number of Properties Potholed Independent of the 2024 ALSLR Program (Second Six Months Only)[2]			**891**

[1] This includes critical customers that were originally assigned a p-value < 0.5. No critical customers under this category were potholed in the second six months of 2024.

[2] Includes six additional properties not included in above categories. Of the six, four properties with a February 2020 p-value of 0, and two properties 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

[27] See Appendix INV-7 Results from Visual Verifications (Second Six-Month Period of 2024).

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 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 3-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 alone is known to achieve success for 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 lead service line inventory refinement of unlikely LSLs to known non-lead.

RESULTS FOR WATER QUALITY SAMPLING AT PROPERTIES INCLUDED IN THE 2024 ALSLR PLAN ARE PRESENTED IN TABLE 20 (I.E., VERIFICATION PRE-LSL REPLACEMENT SAMPLING) AND RESULTS FROM PROPERTIES NOT INCLUDED IN THE 2024 ALSLR PLAN ARE PRESENTED IN

Table 21 (i.e., investigative sampling).[28] 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 because of the degree of lead reduction achieved when pH is consistently maintained at 8.8 ± 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 3-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 ≥ 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.

[28] See Appendix INV-8 Water Quality Sampling (Second Six-Month Period of 2024).

TABLE 20. OBSERVATIONS FROM WATER QUALITY INVESTIGATIONS AS PART OF THE 2024 ALSLR PLAN (JULY 1 TO DEC. 31, 2024)

Service Line Status	Total Number of Investigations[1]	Water Quality Observations	Follow up Action
Initial Status 0.5 ≤ p ≤ 0.9	129	Confirmed lead.[2]	Property added to list for LSL replacement and is scheduled to be replaced.
	332	Non-detect.[3]	Additional investigation is required.
	91	Inconclusive.[4]	Additional investigation is required.
Initial Status 0.01 ≤ p < 0.5	0	Confirmed lead.[2]	Property added to list for LSL replacement and is scheduled to be replaced.
	70	Non-detect.[3]	Additional investigation is required.
	1	Inconclusive.[4]	Additional investigation is required.
Total Number of Water Quality Samples within 2024 ALSLR Program (Second Six Months Only)[5,6,7]			**626**

[1] 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).
[2] Lead measured ≥ 3 µg/L in the second or third sample bottle from the three-bottle test.
[3] Lead measured < 1 µg/L in the second and third sample bottle from the three-bottle test.
[4] All other tests where lead measured < 3 µg/L in the second and third sample bottle from the three-bottle test.
[5] Includes three additional properties, not included in the above categories, with an initial p-value of 0.
[6] Includes zero additional properties, not included in the above categories, with an initial p-value of 1.
[7] Does not include six 1-bottle kits that were part of the 2024 ALSLR plan.

TABLE 21. OBSERVATIONS FROM WATER QUALITY INVESTIGATIONS INDEPENDENT OF THE 2024 ALSLR PLAN (JULY 1 TO DEC. 31, 2024)

Service Line Status	Total Number of Investigations[1]	Water Quality Observations	Follow up Action
Initial Status 0.5 ≤ p ≤ 0.9	98	Confirmed lead.[2]	Property added to list for LSL replacement and is scheduled to be replaced.
	288	Non-detect.[3]	Additional investigation is required.
	65	Inconclusive.[4]	Additional investigation is required.
Initial Status 0.01 ≤ p < 0.5	0	Confirmed lead.[2]	Property added to list for LSL replacement and is scheduled to be replaced.
	376	Non-detect.[3]	Additional investigation is required.
	11	Inconclusive.[4]	Additional investigation is required.
Total Number of Water Quality Samples Independent of 2024 ALSLR Program (Second Six Months Only)[5,6,7]			**854**

[1] 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.
[2] Lead measured ≥ 3 µg/L in the second or third sample bottle from the three-bottle test.
[3] Lead measured < 1 µg/L in the second and third sample bottle from the three-bottle test.
[4] All other tests where lead measured < 3 µg/L in the second and third sample bottle from the three-bottle test.
[5] Includes 16 additional properties, not included in the above categories, with an initial p-value of 0.
[6] Includes zero additional properties, not included in the above categories, with an initial p-value of 1.
[7] Does not include 78 1-bottle kits that were independent of the 2024 ALSLR plan.

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 (i.e., invoices) 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 second six-month period of 2024, desktop reviews were conducted on 145 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.[29] 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 prior and check 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 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.[30] After a review of validation data against material recommendations and ensuring there are no conflicting data for the material designation change to lead or non-lead through the multi-source analysis approach, this

[29] See Appendix INV-10 Predictive Model Technical Memorandum from the 2023 Annual Report.
[30] For detailed explanations of predictive modelling terms such as "negative predictive value" and "confidence", see Appendix INV-10 Predictive Model Technical Memorandum from the 2023 Annual Report.

evaluation led to 5,978 material designation changes to known non-lead and 2,974 material designation changes to known lead in the second six-month period 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 22 for 2024.

TABLE 22. NUMBER OF INVESTIGATIONS PERFORMED TO DETERMINE THE MATERIAL OF THE SERVICE LINE (JULY 1 AND DEC. 31, 2024)

	Count
Number of Potholing Investigations	3,788
Number of Interior Inspections	1,824
Number of Water Quality Samples	1,291
Number of Desktop Investigations	145
Number of Predictive Model Investigations	8,956
Total Number of Investigations Completed in the Second Six Months of 2024	16,004
Number of Investigations Not Previously Reported in 2024[1]	0

[1] A total of 908 pothole investigations, 381 interior inspections, 348 water quality investigations, one predictive model investigation, and seven desktop investigations reported during in the semi-annual report were later replaced and have been removed from the investigation totals.

Table 23 calculates the unknown service lines investigated for 2024 and the cumulative annual average percent since program inception. Per the 2022 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 23. YEAR OVER YEAR COMPARISON OF UNKNOWN SERVICE LINES INVESTIGATED

	2020	2021	2022	2023	2024
Annual Unknown Service Lines Investigated					
Annual Regulatory Target	1,169	1,169	1,169	2,420	2,420
Total Number of Unknown Service Lines Investigated	3,326	4,562	4,918	71,776	17,962
Number of Service Lines Investigations Reported after Submission of the Annual Report[1]	2,034	0	- 825	0	TBD[4]
Cumulative Unknown Service Lines Investigated					
Cumulative Unknown Service Lines Investigated[2]	5,360	9,922	14,015	85,791	103,753
Cumulative Annual Average of Unknown Service Lines Investigated	5,360	4,961	4,672	21,448	20,751
Cumulative Annual Average Percent of Unknown Service Lines Investigated[3]	3.1%	2.9%	2.7%	12.4%	12.0%

[1] 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.

[2] 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.

[3] Per the 2022 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).

[4] To be calculated in the 2025 First Semi-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 Reduction Program website (https://www.denverwater.org/your-water/water-quality/lead).

On Jan. 22, 2025, the publicly available map was updated and reposted, incorporating the Dec. 31, 2024, LSL Inventory. An updated inventory summary table is provided with each semi-annual report.[31] The website map is updated quarterly to reflect these changes to the LSL Inventory and will be updated and re-posted in the spring.

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

Between July 1 and Dec. 31, 2024, updates to the LSL Inventory continued as additional data were gathered and reviewed. During this period, 20,076 changes were made to the LSL Inventory of which 18,051 were changes to the status of the service line (i.e., p-value).[32] This

[31] See Appendix INV-5 Summary of Service Line Status and p-Value (Second Six-Month Period of 2024).

[32] See Appendix INV-6B Line by Line p-Value Changes by Status (Second 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, 200 service lines were removed from the inventory as tap cuts or non-potable service connections. Service lines previously deemed inactive were added back to the inventory upon review of the data, affecting 36 properties in this reporting period.[33] These changes are accounted for in Table 15.

LCRR INVENTORY SUBMITTAL

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 90,000 investigations in 2023 and the first half of 2024, equating to 78,459 distinct service lines investigated. The initial lead service line inventory under the LCRR was submitted to the regulators prior to the Oct. 16, 2024, deadline, and Denver Water continued to conduct investigations to refine the inventory in the latter half of 2024.

Denver Water has investigated about 60% of the unknown service lines from the baseline inventory submitted in 2019. Under the LCRI, Denver Water will continue to focus on identifying service line materials to further refine the lead service line inventory and remove properties from the unknown category.

[33] See Appendix INV-6B Line by Line p-Value Changes by Status (Second Six-Month Period of 2024).

7.B.iii LSL Replacements

Section 7.B.iii of the 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 2022 Variance, dated Nov. 30, 2022.*

Replacements under the ALSLR Program started on March 5, 2020, and results from July 1 to Dec. 31, 2024, are described in this section. An overview of the LSL replacement requirements is shown in Table 24.

TABLE 24. OVERVIEW OF 7.B.III REQUIREMENTS

Paragraph Reference	Description	Refer to
4.E	Offer post-LSL replacement sampling within six months.	Ongoing.
7.B.iii.a	Address and date of all replacements.	See Appendix.[1]
7.B.iii.b	Type of replacement.	See Table 25 and Appendix.[2]
7.B.iii.c **4.H**	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.[3]
LRPP III.D (p 62)	Provide education and filters to residents of multi-family properties on the Service Line Refusal List.	Not applicable for this reporting period.[4]
7.B.iii.d	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 25 and Appendix.[3]
LRPP III.D (p 57)	Replace LSL at properties with consistently high lead release and critical customers.	Described in this section.
LRPP III.D (p 58)	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 22.
LRPP III.D (p 60)	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.
LRPP III.D (p 60)	Provide flushing instructions following LSL replacement.	Provided to all customers in post-LSL replacement education package.[5]

[1] See Appendix LSL-6 Addresses and Types of Replacement (Second Six-Month Period of 2024).

[2] See Appendix LSL-7 LSL Replacement Refusal List (Second Six-Month Period of 2024).

[3] See Appendix LSL-8 Properties with a Partial Replacement (Cumulative since Program Inception).

[4] There were 58 multi-family properties added to the Refusal List in 2024, 24 in the last six months. These customers are in the Filter Program, received mailed educational materials (both with the replacement filters and via the annual filter reminder postcard), and will receive sampling kits in early 2025.

[5] 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 Dec. 31, 2024) as well as program-to-date (Jan. 1, 2020, through Dec. 31, 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.

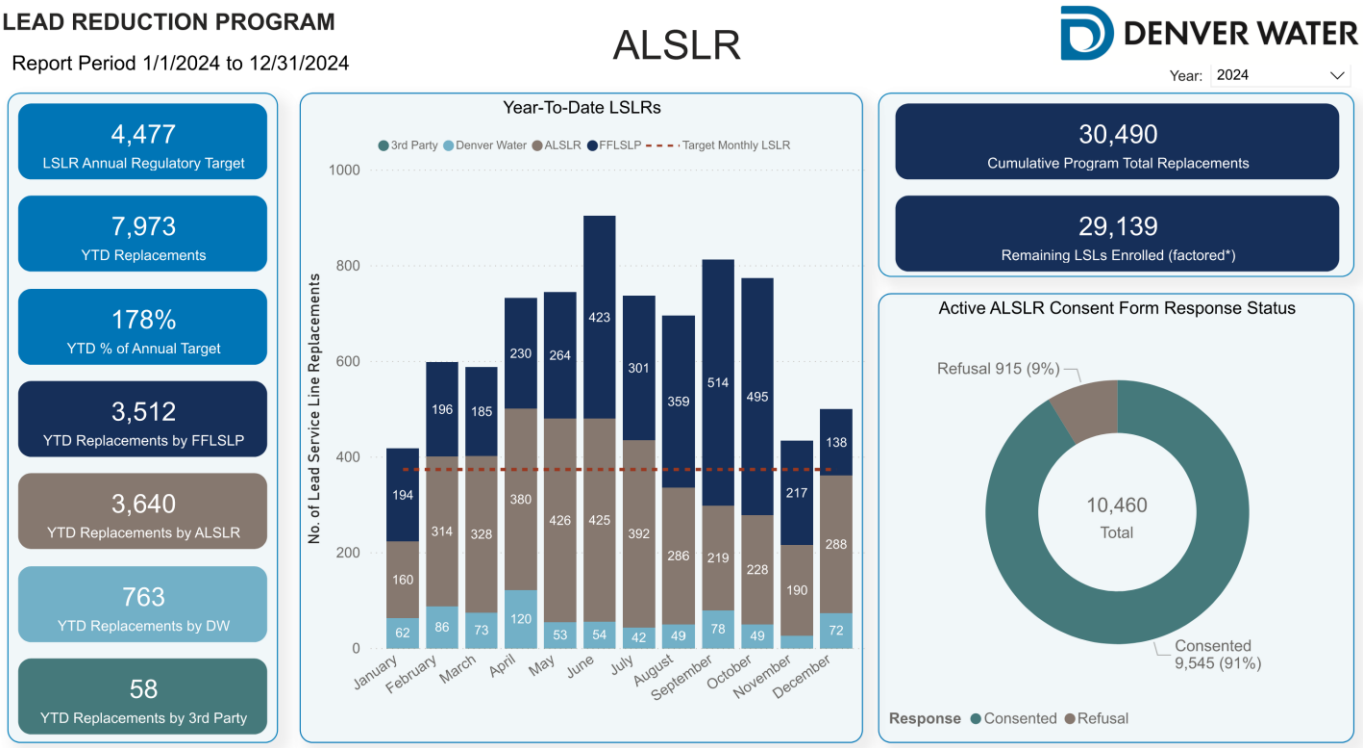

FIGURE 6. LEAD SERVICE LINE REPLACEMENT DASHBOARD

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

Denver Water T&D crews started LSL replacements in the fifth program year on Jan. 1, 2024, and ALSLR contractors started on Jan. 2, 2024. The ALSLR contractors focused primarily on geographic task order work areas that also included 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 eleven geographic task orders each with approximately 400 to 500 properties each were developed and issued to three ALSLR contractors. A total of 19 work areas each with approximately 300 to 400 properties each were developed and issued to three Federal contractors. A list of addresses and dates for each replacement can be found in the appendices.[34]

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 daycare or child care facility added to CDPHE's licensed child care facility dataset since 2020

[34] See Appendix LSL-6 Addresses and Types of Replacement (Second Six-Month Period of 2024).

was added to the 2024 ALSLR Plan. At the start of the year, the critical customer list included 769 properties verified as critical customers within the City and County of Denver.[35] 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, 18 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, 17 critical customers remain with either unknown 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.

For the period of Jan. 1 through Dec. 31, 2024, Denver Water fully achieved this metric replacing 7,973 LSLs. The data for the year-end inventory[36] are summarized as follows:

- Replacements completed by ALSLR contractors between Jan. 2 and Dec. 31, 2024, the last day of the year that contractors worked in the field.[37]
- Replacements completed by T&D between Jan. 1 and Dec. 31, 2024, including from water main projects, emergency repairs, and critical customers (such as schools and child care facilities).[38]

[35] This number includes all critical customers within the service area, regardless of p-value.
[36] See Appendix INV-6B Line by Line p-Value Changes by Status (Second Six-Month Period of 2024) and previous semi-annual reports.
[37] Properties with a p-value ≥ 0.5 in the 2024 ALSLR Plan are verified prior to replacement and are not counted as replaced if copper is observed upon full excavation or pulling the entire service.
[38] The last replacement of 2024 was on Dec. 31, 2024. T&D replacements are counted as an LSL replacement if i) the initial p-value is ≥ 0.5 regardless of what field crews report for the "prior" material or ii) documentation from another source indicates that lead or galvanized is observed.

- Replacements completed by third parties, including tap cuts (cut and reactivated in 2024), reimbursements and properties inspected by Denver Water completed between Jan. 3 and Dec. 17, 2024.[39]
- There were 26 replacements documented in areas served by distributors.

Based on the base LSL Inventory set forth in Table 15, 7% is equivalent to 4,477 LSL replacements per year and this was maintained as the target for 2024. The number and dates of replacements are used as an input to the equivalency model. The total number of and types of replacements completed between July 1 and Dec. 31, 2024 are presented in Table 25 and the total replacements for 2024 are summarized in Table 26. Denver Water maintains a detailed list of the type of LSL replacements completed and the associated addresses.[40]

[39] The last tap cut and reactivation replacement was on Sept. 27, 2024. The last reimbursement and the last inspection of a third-party replacement was on April 24, 2024, and July 15, 2024, respectively.

[40] See Appendix LSL-6 Addresses and Types of Replacement (Second Six-Month Period of 2024).

TABLE 25. TYPE OF LSL REPLACEMENTS (JULY 1 TO DEC. 31, 2024)

Type of LSL Replacement July 1 to Dec. 31, 2024[1]	Denver Water (Water Main, Emergency, and ALSLR)[2]	Third Party (Developer, Homeowner, and Other)[3]	Total
Full Lead Replacement[4]	1,646	28	1,674
Partial Lead Replacement, such that no Lead Remains After Replacement[5]	1,594	0	1,594
Full Galvanized Replacement	44	0	44
Partial Galvanized, such that no Lead or Galvanized Remains After Replacement[6]	658	0	658
TOTAL REPLACEMENTS in Reporting Period, with no Lead Remaining After Replacement	**3,942**	**28**	**3,970**
TOTAL REPLACEMENTS Not Previously Reported[7]	62	8	70
TOTAL REPLACEMENTS completed since LRP Inception	**29,115**	**1,375**	**30,490**
Emergency Repair, Partial Replacement (i.e., where consent was NOT granted and lead may remain in the ground)[8]	0	0	0

[1] Properties that had a replacement on or before Dec. 31, 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 First Semi-Annual Report of 2025.

[2] Includes LSL replacements completed as part of water main projects, emergency repairs, scheduled repairs, and ALSLR individual and geographic replacements completed by Denver Water or its contractors.

[3] Includes LSL replacements completed by developers, property owners and other government agencies as identified in Appendix LSL-6 (Addresses and Types of Replacement (Second Six-Month Period of 2024)).

[4] 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 ≥ 0.5 at properties where a service line replacement was completed by someone other than the ALSLR contractors (such as third party).

[5] 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 ≥ 0.5. See Appendix LSL-6 (Addresses and Types of Replacement (Second Six-Month Period of 2024)).

[6] Includes replacements of service lines described as copper-galvanized, galvanized-copper, and galvanized-PEX.

[7] This includes replacements completed since Program Inception but not previously reported (70 added); see Appendix LSL-9 (Addresses and Types of Replacements for Properties Not Previously Counted and Duplicates (Since Program Inception)).

[8] Includes all properties cumulative since program inception; see Appendix LSL-8 (Properties with a Partial Replacement (Cumulative since Program Inception)).

The cumulative average annual replacement rate, defined in the Nov. 30, 2022, Variance Order, that was achieved in 2024 is calculated in Table 26.

TABLE 26. LSL REPLACEMENT RATES FOR 2024

	2024
Total Number of Replacements	7,973
Cumulative Total Number of Replacements[1]	30,490
Cumulative Average Annual Replacement at End of Program Year[2]	6,098
Cumulative Average Annual Replacement Rate	9.5% of 63,955

[1] The Cumulative Total Number of Replacements includes all reportable replacements from previous reports, including any not previously reported replacements captured outside their respective reporting periods, and subtracting any removals reported during all periods. Removals are due to further review and are deemed not to be reportable.

[2] Per the Order, the cumulative average must be calculated using the total number of LSLs replaced during the term of the Order divided by the total estimated number of confirmed and unknown likely LSLs, consistent with the initial LSL inventory. The average of 30,490 replacements over five years is 6,098 replacements per year. As a percentage, 6,098 of 63,955 is 9.5%.

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

Per Section 7.B.iii.c of the 2022 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 September 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.[41] Reconnaissance or pre-construction meetings are conducted with each property owner to plan the LSL replacement work and schedule the replacement. The lead service line replacement consent form was updated earlier in 2024 to allow for tenant signature and removed the option for refusal to maximize the likelihood of obtaining consent.

A summary of the number of property owners contacted and number of signed consent forms returned is presented in Table 27. Between July 1 and Dec. 31, 2024, a total of 915 property owners refused to participate in the ALSLR Program or were nonresponsive 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.

[41] See Appendix LSL-7 LSL Replacement Refusal List (Second Six-Month Period of 2024).

TABLE 27. SUMMARY OF CONSENT AND LSL REFUSAL LIST (JULY 1 TO DEC. 31, 2024)

Description	Customer Consented[1]	Customer Refused[2]
Total Number of Properties during the Second Six Months of 2024	4,397	326
Total Number of Properties Year-to-Date	9,545	915

[1] 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.
[2] The total number of refusals year-to-date includes attempts made by the ALSLR contractors (243 properties) and Federal contractors (665 properties). These include properties with descriptions of "consent not granted due to refusal" and "nonresponsive" after at least three attempts were made and the task order goes through administrative close out. When a customer refuses or is nonresponsive, the service point ID is provided to the COE team for follow-up. See explanations in Appendix LSL-7 LSL Replacement Refusal List (Second Six-Month Period of 2024).

A range of outreach methods is used to contact property owners.[42] Denver Water sends at least two attempts at contact by mail plus at least 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 "nonresponsive" 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. "Nonresponsive" 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 Program, 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 provided.[43] 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 nonresponsive 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

[42] See Appendix COE-14 2024 COE Plan included with the Annual Report for 2023.
[43] See Appendix LSL-7 LSL Replacement Refusal List (Second Six Months of 2024).

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 July 1 and Dec. 31, 2024, 24 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.[44]

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 "nonresponsive" until the issue is resolved, and the LSL can be replaced.[45]

Emergency Repairs Resulting in a Partial LSL Replacement [7.B.iii.d]

During this reporting period, eight 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 129 properties since program inception in January 2020 as a result of:[46]

- 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 five properties).
- The property owner declined replacement at the time of the work (this affected 31 properties).
- No consent to perform the full replacement due to no response from the property owner (this affected 73 properties).
- Restricted access due to the interior plumbing arrangement or unsafe working conditions (this affected 10 properties).
- Property redevelopment (two properties).
- To be rescheduled because property owner was not comfortable with replacement during COVID-19 (one property).
- A segment of the service line was replaced. The other half of the service line is believed to have been previously replaced due to customer records but pending documentation and approval (three properties).

[44] See Appendix LSL-10 Ownership Changes for Properties on the Refusal List (Second Six-Month Period of 2024).
[45] See Appendix COE-D.12 Safety or Repairs Needed Notification Letter of Second Quarter Report (2020).
[46] See Appendix LSL-8 Properties with a Partial Replacement (Cumulative since LRP Inception).

- Meter to main replaced, meter to building potholing and/or replacement scheduled for a later date (four 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 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[47], 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 2022 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.

[47] The 2022 Variance requires a filter adoption survey every other year, rather than every year, as previously required in the 2019 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 15, it is estimated that Filter Program participants consist of approximately 50,070 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 was sent in 2024 under the updated Variance) and the Filter Program participant removals.[48] 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.

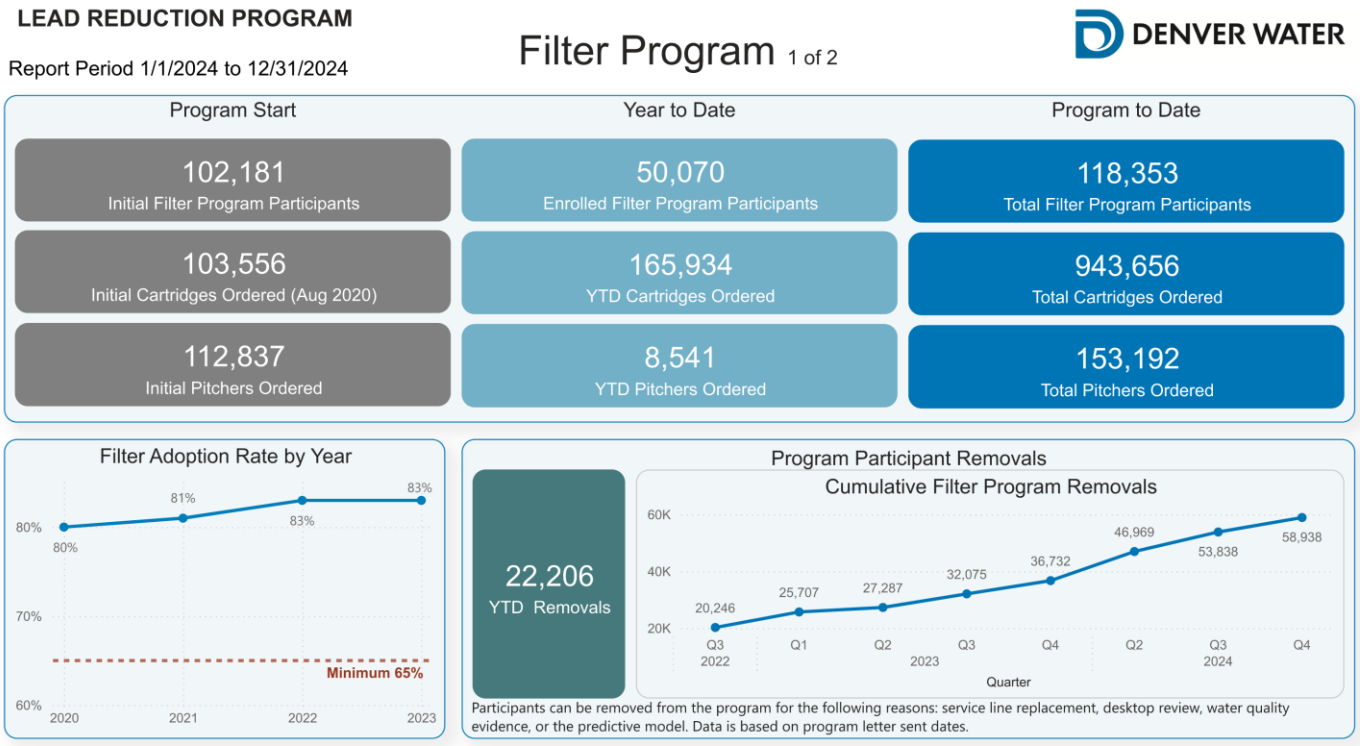

FIGURE 7. FILTER PROGRAM (1 OF 2) DASHBOARD

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.

[48] Per the Variance, the formal filter adoption survey is to be sent every other year, beginning in 2023. Therefore, a formal filter adoption survey was be sent in 2024. The next formal filter adoption survey will be sent in 2025.

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.

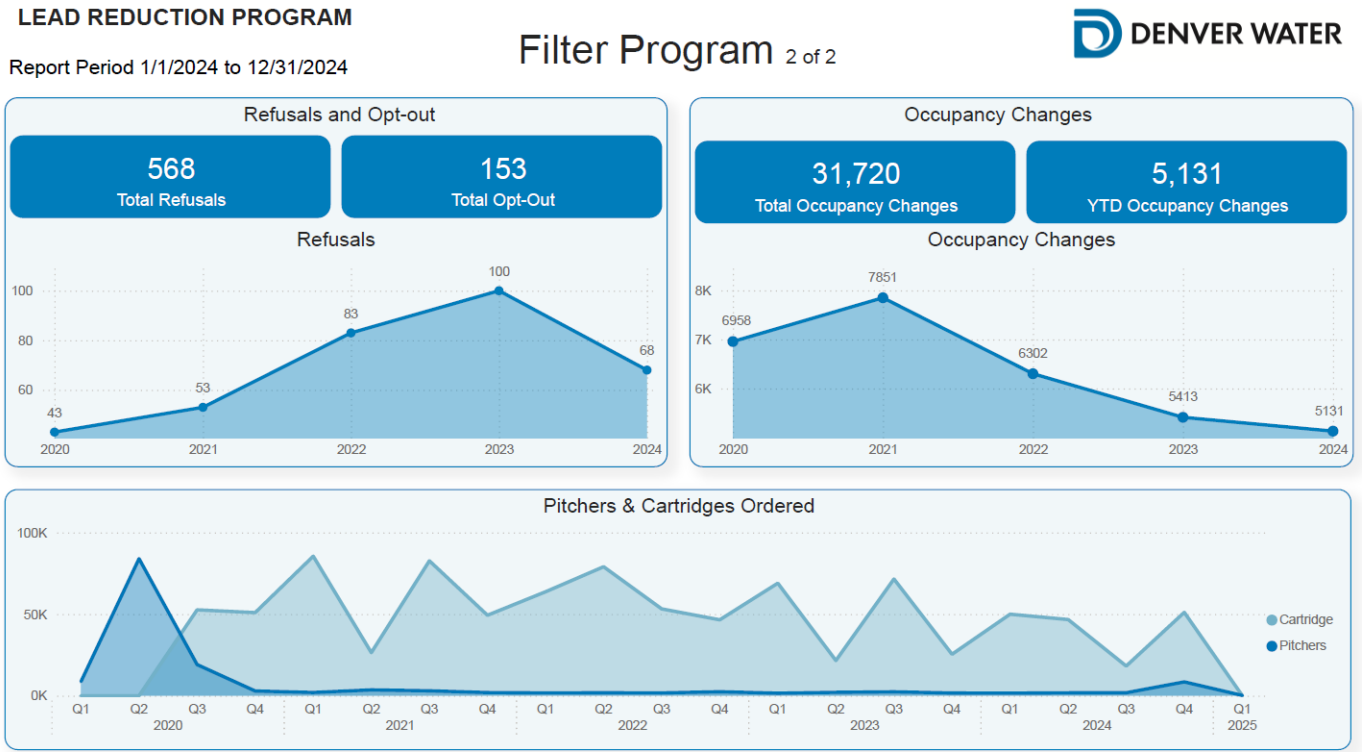

FIGURE 8. FILTER PROGRAM (2 OF 2) DASHBOARD

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 28.

TABLE 28. 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 29.
7.B.iv.b	Total number of filters and cartridges distributed per year.	See Table 29.
7.B.iv.c	Percent filter adoption rate during a survey year.[1] Description of method to determine the filter adoption rate.	See this section.
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.[2]
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.[3]
7.B.iv.f	Confirmation of filter performance in the field (50+ locations included in the LCR compliance sampling).	See Appendix for sample results from Sept. 11 to Dec. 21, 2023.[2]

Paragraph Reference	Description	Refer to
7.B.iv.g **5.F.ii**	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.
7.B.iv.h	Notify CDPHE and EPA within 30 days of receiving sample results indicating measurable lead in filtered samples.	See Appendix.[4]
5.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.
5.C	Provide education materials within 30 days of a change in customer account. Provide filters and replacement cartridges within 35 days of a change in customer account.	See Appendix.[5,6]
5.D	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 3-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.
5.E.i	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 this section. Approved on Sept. 10, 2020.[7]
5.G	Document contact to provide lead outreach and education materials to at least 95% of customers enrolled in the Filter Program each year.	See this section.
LRPP Executive Summary (p 9) and III.C (p 56)	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.
LRPP III.C (p 55)	Survey filter use as part of ALSLR Program following LSL replacement.	See this section and Appendix.[8]

[1] The 2022 Variance requires a filter adoption survey every other year (starting in 2023), rather than every year, as previously required in the 2019 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.

[2] See Appendix FIL-9 Filter Program Opt-Outs (Second Six-Month Period of 2024).

[3] See Appendix FIL-10 Filter Program Refusals (Second Six-Month Period of 2024).

[4] See Appendix FIL-11 Confirmation of Filter Performance in Field Results (Second Six-Month Period of 2024).

[5] See Appendix FIL-12 Occupancy Changes – COE Distribution (Second Six-Month Period of 2024).

[6] See Appendix FIL-13 Occupancy Changes – Pitcher Filter Distribution (Second Six-Month Period of 2024).

[7] See Third Quarter Report of 2020 (Appendix FIL-29 OMB Approved Filter Adoption Survey Questions).

[8] See Appendix FIL-14 Informal Filter Adoption Survey Results Summary (Second 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 2022 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 29 for pitcher filter distribution.

TABLE 29. SUMMARY OF FILTER DISTRIBUTION (JULY 1 TO DEC. 31, 2024)

Description	Count	Comment
Initial Pitcher Distribution for Customers Enrolled between July 1 and Dec. 31, 2024	3,134	
Total Number of Households Provided with a Filter Kit between July 1 and Dec. 31, 2024	4,199	
Number of Households that Use their own NSF-Certified Filter or Bottled Water between July 1 and Dec. 31, 2024	9	See Appendix.[1]
Number of Households that Declined to Use a Filter or Bottled Water between July 1 and Dec. 31, 2024	99	See Appendix.[2]
Total Number of Households Provided with a Filter Kit in 2024	7,497	
Number of Households that Use their own NSF-Certified Filter or Bottled Water in 2024	14	
Number of Households that Declined to Use a Filter or Bottled Water in 2024	173	

[1] See Appendix FIL-9 Filter Program Opt-Outs (Second Six-Month Period of 2024).

[2] See Appendix FIL-10 Filter Program Refusals (Second Six-Month Period of 2024).

The count for initial distribution of pitcher filters in Table 29 includes new customers enrolled in the Filter Program, customers that were previously enrolled in the Filter Program but that failed to receive their initial pitcher filter, and customers added to the Filter Program due to a change in occupancy. Customers receiving an initial pitcher filter in 2024 represents approximately 6% of the current 50,070 customers enrolled in the Filter Program. [49] 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.

[49] Differing from previous reports, customers receiving their initial pitcher filter due to an occupancy or tenant change are included in this percentage. Additionally, in 2024 a detailed review of multi-unit properties occurred identifying new units that were not previously in the LRP.

An analysis of return-to-sender addresses was performed in 2020 and described in the Third Quarterly Report for 2020. A more stringent evaluation was conducted in the third quarter of 2024 utilizing aerial photography, street level imagery, and metered consumption data to validate the property address and inclusion in the LRP. Upon reconciliation, a filter kit was re-sent to the correct address or if determined to be a vacant lot or premise, the property was removed from the LRP. This evaluation has been conducted on all return-to-sender addresses identified since September 2024 and will continue to be used in the future. 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. In the past six months, 1,066 properties were reviewed. 30 of these properties were pitcher kit deliveries and 1,036 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 2022 Variance, Denver Water must report "the total number of filters and replacement cartridges distributed per Program Year."

Between July 1 and Dec. 31, 2024, filter kits were distributed to an additional 4,199[50] customers enrolled in the Filter Program, bringing the total distribution amount for 2024 to 7,497.

During this same period, 85,280 replacement filter cartridges were distributed to 53,040 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.[51] Of the 85,280 replacement filter cartridges distributed, 4,045 attempted replacement cartridge deliveries were unsuccessful and returned to sender. Of the 4,045 that were returned, 1,119 addresses were reviewed as part of the return-to-sender evaluation. The remaining 2,926 addresses will be evaluated in 2025. 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 30.

[50] This number refers to the number of properties that received a new filter based on occupancy changes, high-capacity, broken filters, lost filters, etc. The number of filters distributed to these properties totals 4,199.

[51] See the First Semi-Annual Report of 2021 for more details.

TABLE 30. SUMMARY OF SIX-MONTH SUPPLY POST-LSL REPLACEMENT FILTER DISTRIBUTION (JULY 1 TO DEC. 31, 2024)

Description	Count	Comment
Number of Households Provided with Six-Month Supply of Filter Replacements Post-Lead Service Line Replacement between July 1 and Dec. 31, 2024[1,2]	4,818	This includes emergency repairs and replacements performed by Denver Water and third parties.

[1] This value may not match the number of lead service line replacements completed between July 1 and Dec. 31, 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.
[2] This value includes filter distribution to properties where the LSL replacement was completed by a third party, as identified in Table 25.

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

Section 5.D of the 2022 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 second six-month reporting period of 2024 (i.e., a select household as identified in paragraph 5.D of the 2022 Variance).[52]

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

Under Section 5.E.i of the 2022 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 2022 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

[52] See Appendix CCT-8 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%.

ESTIMATED FILTER ADOPTION RATE

The formal filter adoption survey was conducted in 2023 and therefore was not conducted in 2024. The total filter adoption rate for 2023 was calculated at 83%.[53] This percentage is used in the equivalency model for 2024. The next formal filter adoption survey will occur in 2025.

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 4,370 participants were captured in the LRP database from the pre-construction meetings and 94 customers responded to all questions in the informal filter adoption survey.[54,55]

- Of those 94 customers, 77 indicated that they used filtered or bottled water for drinking (82%) and 77 customers indicated they use their filter for cooking (82%).
- 100% of households with a formula-fed infant indicated that they used filtered water when preparing formula. Of which, two customers indicated they have an infant under 24 months who is formula fed and both customers used filtered water.

Looking solely at customers who are leaving the filter program: Of the total 4,370 responses, 2,322 had service line replacements between July 1, 2024, and Dec. 31, 2024. This accounts for 58% of all customers who had their LSLs replaced in 2024 (3,970 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 2,322 customers who had service line replacements, 54 customers responded to the informal filter adoption survey. 51 customers indicated that they used filtered or bottled water for drinking (94%) and 50 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. Two customers indicated they have an infant under 24 months who is formula fed and both 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 the meetings focus on filter use.

[53] See the 2023 Annual Report for more details on the 2023 formal filter adoption survey results.
[54] See Appendix FIL-14 Informal Filter Adoption Survey Results Summary (Second Six-Month Period of 2024).
[55] See Appendix FIL-15 Informal Filter Adoption Survey Detailed Responses (Second Six-Month Period of 2024).

Occupancy Changes [5.C]

Section 5.C of the 2022 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 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 2,871 occupancy changes which include both property owners and tenants between July 1 and Dec. 31, 2024.[56] Of those occupancy changes, 1,565 property owners were alerted of these occupancy changes and received an introductory booklet.[57] 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 30 and 35 days respectively, at all properties but two where a change in occupancy occurred for this reporting period.[58]

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 2022 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 153 customers that have opted out since the launch of the Filter Program, 30 use bottled water as an alternative to the filter and 40 use their own filter certified National Sanitation Foundation (NSF) 53 for lead removal. For the remaining 83 customers, Denver Water was unable to confirm if the customer was using an NSF 53-certified filter.[59] A summary of the Filter Program opt-outs is shown in Table 31. Contact with customers continues

[56] See Appendix FIL-13 Occupancy Changes - Pitcher Filter Distribution (Second Six-Month Period of 2024).
[57] 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.
[58] See Appendix FIL-12 Occupancy Changes – COE Distribution (Second Six-Month Period of 2024).
[59] See Appendix FIL-9 Filter Program Opt-Outs (Second Six-Month Period of 2024).

to be attempted as part of an annual reminder to customers that have opted out or refused to participate in the Filter Program.[60], [61]

TABLE 31. SUMMARY OF FILTER PROGRAM OPT-OUTS

Program Year	Number of Properties			
	Total Opt Outs	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)	66	9	8	49
2021 (Jan. 1 to Dec. 31, 2021)	45	6	5	34
2022 (Jan. 1 to Dec. 31, 2022)	18	9	9	0
2023 (Jan. 1 to Dec. 31, 2023)	10	4	6	0
2024 (Jan. 1 to Dec. 31, 2024)	14	2	12	0
Total Since LRP Inception	153	30	40	83
Total Removed from LRP Since Program Inception	72	16	11	45
Total Remaining in LRP	81	14	29	38

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

Per Section 7.B.iv.e of the 2022 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 July 1 to Dec. 31, 2024, notice of refusal to participate in the Filter Program was received for 99 properties.[62] 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 568 since the inception of the LRP. A summary of the refusals to date is shown in Table 32. [63]

[60] The use of an NSF 53 certified filter could not be confirmed at some properties based on call center records. This affected two customers that indicated that they use their own filter; these properties were moved from the Opt-Out List to the Refusal List.
[61] A detailed review of Opt-Out requests was conducted in the second six-month period of 2024, adjusting previous Opt-Out totals and classifications.
[62] See Appendix FIL-10 Filter Program Refusals (Second Six-Month Period of 2024).
[63] A detailed review of Refusal requests was conducted in the second six-month period of 2024, adjusting previous Refusal totals.

TABLE 32. SUMMARY OF FILTER REFUSAL LIST

Reporting Period	Number of Properties Refusing to Participate
2020 (Jan. 1 to Dec. 31, 2020)	40
2021 (Jan. 1 to Dec. 31, 2021)	77
2022 (Jan. 1 to Dec. 31, 2022)	175
2023 (Jan. 1 to Dec. 31, 2023)	103
2024 (Jan. 1 to Dec. 31, 2024)	173
Total Since LRP Inception	568
Total Removed from LRP Since Program Inception	220
Total Remaining in LRP	348

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.[64]
- 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.[65]
- Detailed responses from the informal filter use field survey responses collected as part of LSL replacement activities.[66]
- Confirmation of pitcher filter performance in the field.[67]
- List of premise addresses and service point identification numbers for all households that opt-out of the Filter Program.[68]
- Occupancy changes for pitcher filter distribution.[69]
- Occupancy changes for filter education information.[70]

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

Per Section 7.B.iv.f of the 2022 Variance, Denver Water must report filter lead sampling results collected. Field sampling is conducted by Denver Water in conjunction with LCR

[64] See Appendix FIL-10 Filter Program Refusals (Second Six-Month Period of 2024).
[65] See Appendix FIL-14 Informal Filter Adoption Survey Results Summary (Second Six-Month Period of 2024).
[66] See Appendix FIL-15 Informal Filter Adoption Survey Detailed Responses (Second Six-Month Period of 2024).
[67] See Appendix FIL-11 Confirmation of Filter Performance in Field Results (Second Six-Month Period of 2024).
[68] See Appendix FIL-9 Filter Program Opt-Outs (Second Six-Month Period of 2024).
[69] See Appendix FIL-13 Occupancy Changes - Pitcher Filter Distribution (Second Six-Month Period of 2024).
[70] See Appendix FIL-12 Occupancy Changes - COE Distribution (Second Six-Month Period of 2024).

compliance sampling (see section 7.B.i). All samples collected to meet this requirement for the second six-month compliance period of 2024 are included in this reporting period. Samples were collected from 87 properties between Aug. 1, 2024, and Dec. 12, 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.

Lead was measured in the unfiltered tap water at less than 1 µg/L in 25 samples collected on the same day the filter effluent sample was collected. Lead was measured below the detection limit in filtered water at 74 of the 87 properties and below 3 µg/L at all properties except three homes that were below 10 ug/L.[71] These homes' filters were investigated and replaced due to age or inadequate filter cartridge placement. 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). There were no properties in this reporting period contained 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 no 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 2022 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, four 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 2022 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 were mailed in October and are discussed in Section 7.B.vi.[72]

[71] See Appendix FIL-11 Confirmation of Filter Performance in Field Results (Second Six-Month Period of 2024).

[72] See Appendix COE-17 Filter Use Reminder Postcard.

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 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 2022 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 33.

TABLE 33. SUMMARY OF COMPLIANCE

Paragraph	Description	Comment
2.C	**C. Corrosion Control Treatment Metric.** Denver Water 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 CaCO3; 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 CaCO3. CDPHE may modify these required water quality parameter ranges through a modification decision under 5 CCR 1002-11.26(3)(d)(ii).	**See Section 7.B.i**
3.D	**D. LSL Inventory Compliance Metric.** Denver 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.	**See Section 7.B.ii**
4.I	**I. Accelerated LSL Replacement Compliance Metric.** Denver Water 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.	**See Section 7.B.iii**
5.G	**G. Filter Communication Compliance Metric.** 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. . . 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.	**See Section 7.B.vi**
6.B	**B. Comprehensive LRPP Performance Metric.** Denver Water must demonstrate to EPA's satisfaction, using the updated equivalency model results as reported under paragraph 7.C, that the combined actual	**See Part 3 of this report.**

Paragraph	Description	Comment
	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.	
6.C	**C. Health Equity and Environmental Justice (HE and EJ) Compliance 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.	**See Section 7.B.vii**

7.B.vi Communications, Outreach and Education

Section 7.B.vi of the 2022 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 2022 Variance, dated Nov. 30, 2022.*

During the last 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 two virtual community meetings on construction preparedness and the Lead and Copper Rule Revisions, convening the Stakeholder Advisory Committee for two quarterly meetings and continuing efforts to encourage customers to use filtered water. COE efforts specific to each LRP element are also included in those element sections of this report and are detailed in Table 34.

TABLE 34. OVERVIEW OF 7.B.VI REQUIREMENTS

Paragraph	Description	Comment
7.B.vi	2020 COE Plan 2021 COE Plan 2022 COE Plan 2023 COE Plan 2024 COE Plan 2025 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. See Appendix.[1]
7.B.vi.a	Description of COE activities conducted. Copy of materials.	Discussed in this section. See Appendices for copies of materials included.[2]
7.B.vi.b	Ambassador Program Overview.	See Section 7.B.vii.
7.B.vi.c	Response, date and time of in-person surveys of filter adoption and use.	See Section 7.B.iv. See Appendix.[3]
8.G	Notify customers enrolled in Filter Program of LRP and launch multi-media campaign.	Multi-media campaign launched March 23, 2020.
LRPP III.E (p 64)	Targeted messaging to homes with copper piping and lead solder to flush the tap after periods of non-use.	See 2020 through 2024 COE Plans.
LRPP III.F (p 74)	Stakeholder Advisory Committee	Discussed in this section.

[1] See Appendix COE-12 2025 COE Plan.

[2] See Appendices COE-15 through COE-18, and COE-20 through COE-24 for a copy of materials.

[3] See Appendix FIL-14 Informal Filter Adoption Survey Detailed Responses (Second Six-Month Period of 2024).

Outcomes of COE Activities between July 1 and Dec. 31, 2024 (unless otherwise noted) [7.B.vi.a]

- Denver Water hosted two bilingual, one-hour virtual community meetings in August and September focused on preparing customers for lead service line replacement and providing an overview of the Lead and Copper Rule Revisions.[73] To promote the meetings, 53,305 outbound calls were made to customers during this reporting period the day before and the day of the events, with 39,169 bilingual voicemail messages left for those who did not answer. In total, 2,334 customers participated in a virtual community meeting during the last six months of the year and 5,632 participated in a meeting in 2024.
- In addition, Denver Water received three requests for LRP presentations and/or attendance at community and stakeholder events from local, state and national organizations and held these presentations at various times during this reporting period.
- In September, a filter use reminder postcard was mailed to all Filter Program enrollees to encourage proper filter use and maintenance, fulfilling the requirements for direct

[73] See Appendix COE-16 Virtual Community Meetings Email Invitations.

contact with at least 95% of Filter Program enrollees, including those identified as being in areas with HE&EJ concerns, each program year.[74]

- The Stakeholder Advisory Committee convened for two quarterly meetings on Oct. 3 and Dec. 4. The meetings included progress updates on the LRP, updates from committee members on work from their organizations related to lead and/or public health and an overview of new program metrics included in the new LRP Variance. The previous quarterly meetings were held Feb. 8 and May 30 and are described in the First Semi-Annual Report for 2024.
- Contact was made on 85 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 538,030 visits and 888,661 page views since the launch of comprehensive LRP information on March 5, 2020. In 2024 alone, the website received 89,831 visits and 151,049 page views.[75]
- LRP TAP stories published on denverwater.org/TAP received 16,055 views, totaling 41,541 views during 2024.[76]
- Denver Water social media activity reached approximately 30,567 individuals, totaling 132,993 individuals reached during 2024.
- The LRP was mentioned in 185 news media stories, with a potential aggregate readership of 411 million across online news, blogs and television, totaling 270 stories with a potential aggregate readership of 880 million during 2024.[77]

In addition to these outreach activities, Denver Water developed its 2025 COE Plan. The plan identifies goals, target audiences and strategies/tactics that will guide COE outreach efforts in the following year of the LRP.[78]

The following section highlights COE program activities carried out in 2024 from July 1 through Dec. 31 (unless otherwise noted), organized by strategy type.

[74] See Appendix COE-17 Filter Use Reminder Postcard.
[75] See Appendix COE-23 Website Traffic.
[76] See Appendix COE-22 TAP Stories Published.
[77] See Appendix COE-21 Earned Media Reports.
[78] See Appendix COE-12 2025 COE Plan.

Public Outreach

Overview of activity grouped by outreach component:

- Virtual Meetings
    - Denver Water hosted two bilingual, one-hour virtual community meetings on Aug. 22 and Sept. 25.[79] The August meeting provided an overview of the upcoming Lead and Copper Rule Revisions, with a focus on what it means for customers and how customers can help identify their service line material. As part of this, Denver Water's newly developed online self-reporting tool was highlighted as a way for customers to provide information on service line material. The September meeting focused on construction preparedness for customers slated to receive a service line replacement in the remainder of 2024.
    - To promote the meeting about the LCRR, 44,123 outbound calls were made and 31,712 emails sent to all customers with unknown service line material, with bilingual voicemail messages left for those who did not answer. To promote the meeting on construction preparedness, 9,182 outbound calls were made and 7,457 emails sent to customers identified for service line replacement the day before and the day of the event, with bilingual voicemail messages left for those who did not answer. 2,334 customers participated in these virtual community meetings.
- Presentations to organizations were given upon request to provide an overview of the LRP, gather feedback and identify areas for potential coordination. These meetings included the following:
    - Ensuring Safe Water for Your Community: Navigating Customer Access, Funding and LCRI Requirements for Lead Service Line Replacement – The Copper Development Association (Aug. 21).
    - Denver Health, West Side Clinic, Lead Reduction Program Overview (Sept. 9).
    - Building Trust & Equity through the Lead Reduction Program – Water Equity Network (Oct. 31).
- Stakeholder Advisory Committee
    - The Stakeholder Advisory Committee met for its third and fourth quarterly meetings of 2023 on Oct. 3 and Dec. 4.

[79] See Appendix COE-16 Virtual Community Meetings Email Invitations.

        - Representatives reflected a diverse group of organizations, including health care, education, nonprofit and government.[80]
        - At the October meeting, Denver Water hosted a lead service line replacement site visit for the committee. Members observed a replacement in-progress and heard from the construction team about the process and typical opportunities and challenges involved. Committee members noted the experience of seeing a replacement firsthand and meeting community partners deepened their understanding of the program and confidence in speaking about it with people in their networks.
        - At the December meeting, Denver Water provided an update on LRP progress to-date and provided an overview on what to expect in 2025.

- Government Relations
    - Seven 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 and 2025 work areas was published in the December distributor newsletter. Other program updates were included in the September and November newsletters.
    - 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.
    - 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 our investigations confirming a non-lead service line or six months after a lead service line has been replaced.

[80] See 2024 Semi-Annual Report, Appendix COE-1 Stakeholder Advisory Committee 2024 Membership List.

- On a bimonthly basis, distributors with properties in the LRP are provided an inventory update that reflects any changes made to the status of properties in their area because of investigations or service line replacement.
- In 2024, investigation potholing was undertaken in two distributor districts. Distributor customers received the same notifications and communications related to potholing as City and County of Denver customers, and distributors were provided with talking points to support answering customer inquiries. A digital fact sheet outlining the potholing efforts was provided for distributors to use as reference.

- Paid Media
  - The successful paid media strategy implemented since program launch was continued during this reporting period to promote the LRP with focus on areas where residents may not be using filtered water as commonly as others.
  - The campaign ran from Nov. 18 through Dec. 15, generating 1.8 million impressions through digital ads and over 5,260 visits to the LRP website.[81]

- Earned Media
  - The LRP was covered in digital, print and broadcast news, including CBS, Fox 31, Telemundo and El Comercio de Colorado and Natural Resources Defense Council, among others.[82]
  - There were 229 posts about the LRP on social media channels in this reporting period, resulting in 30,567 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 emails on Sept. 25 and Dec. 24 to a database of over 55,305 subscribers. The emails promoted upcoming virtual community meetings and shared how to access meeting recordings, information on 2025 work areas, an overview of program progress to-date, reminders about proper filter use and a link to the online self-reporting tool.[83]
  - Four TAP stories were published on denverwater.org/TAP, which included content related to the LRP. As of Dec. 31, these stories received a total of 8,001 views.[84]

[81] See Appendix COE-20 Paid Media Reports.
[82] See Appendix COE-21 Earned Media Reports.
[83] See Appendix COE-19 Subscriber Emails (September and December).
[84] See Appendix COE-22 TAP Stories Published.

- The LRP website, denverwater.org/Lead (English) and denverwater.org/Plomo (Spanish), was updated with the recordings of the construction preparedness virtual community meetings, dashboards, an updated lead service line inventory and an updated pipe replacement map with the work areas for 2025. Since the launch of the LRP, denverwater.org/Lead has received 538,030 visits and 888,861 page views. There were 46,414 unique website visits from July 1 to Dec. 31, 2024. Since launching in October 2021, denverwater.org/Plomo (the Spanish version of the website) has received 11,917 visits and 15,802 page views. There were 3,912 unique website visits from July 1 to Dec. 31, 2024.[85]

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

The following materials were developed from July 1 to Dec. 31, 2024:

- The public-facing dashboard was updated to share progress and key metrics for the LRP through November 2024, with the December 2024 dashboard to be posted in early January 2025.[86] The updated dashboard is posted monthly to denverwater.org/Lead and is available in both English and Spanish.
- A post-replacement check-in card was created to bridge a gap in communications between service line replacement and post-replacement water testing offers. The card is sent approximately one month following replacement and reminds customers that they should continue to use filtered water up to six months after replacement and that the water test kit offer is upcoming.[87]
- To support the Lead and Copper Rule Revisions, annual notification letters were created, based on the regulatory template, to notify customers with service lines falling in the unknown, galvanized and known lead categories of their status. These were mailed in September to approximately 88,000 customers.[88]
- An online self-reporting tool was developed to guide customers through the process of identifying their service line material through visual observation and inspection. It allows customers to upload information, including photographs, for the LRP Team to evaluate to support refining the service line inventory. The tool was launched in August and promoted in the LCRR virtual community meeting and in subscriber emails.

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

[85] See Appendix COE-23 Website Traffic.
[86] See Figure 1.
[87] See Appendix COE-14 Post-Replacement Follow Up Check In Postcard.
[88] See Appendix COE-13 LCRR Annual Notification Letters.

supports 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. Three sessions were held between July 1 and Dec. 31.
- 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 July 2024, contractors were performing service line replacements in the Villa Park neighborhood when they encountered a customer whose basement had flooded due to an irrigation connection at the property next door. The flooding damaged the property's water heater. While it was not the responsibility of the contractor, they proceeded to replace the water heater and support the customer in getting everything back in working order.
- In September 2024, the Denver Water Contact Center received an email from a customer wishing to express their gratitude for the work done by contractors on the customer's service line replacement. The customer relayed they have two young daughters who have been very interested in the construction process. Contractors have taken the time to explain the work to the children and shown them how certain things work. The children are also bilingual and the customer noted being impressed with how the crew was able to interact with the children in both English and Spanish.

7.B.vii Health Equity and Environmental Justice

Section 7.B.vii of the 2022 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 2022 Variance, dated Nov. 30, 2022.*

An overview of HE&EJ reporting requirements is presented in Table 35.

TABLE 35. Overview of 7.B.vii Requirements

Paragraph Reference	Description	Refer to
7.B.vii LRPP V (p 77)	Summary of activities conducted and designed to address HE&EJ principles.	Described in this section. See LRPP (p 77).
7.B.vii.a	Description of how HE&EJ principles were incorporated into the implementation of the: • ALSLR Program. • Filter Program. • COE Plan.	See First Quarter Report of 2020 and updates in this section.
7.B.vii.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.
7.B.vii.c	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.
7.B.vii.d	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.
LRPP V (p 77)	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.	Described in this section.
LRPP V (p 79)	Collaborate with other agencies to address lead exposure from all sources.	Described in this section.

HE&EJ Integration in the Lead Reduction Program

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 both 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 the 10-15% increase in consent form 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 following sections describe how equity principles were integrated into the various components of the LRP during the second 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 about the LRP. These customized collaborative efforts expand the LRP's reach, build awareness of program requirements and create momentum for behavior change in harder-to-reach communities. There are three components of the Ambassador Program:

- **Contract Partners**: Conduct extensive on-the-ground outreach using 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 supported community outreach activities in the following neighborhoods:
  - Barnum.
  - Barnum West.
  - Chaffee Park.
  - Clayton.
  - Elyria-Swansea.
  - Globeville.
  - Harvey Park.
  - Regis.
  - Sunnyside.
  - West Colfax.

- During the second six months of 2024, CREA Results engaged in the following work:
  - Participated in 45 in-person or virtual events to educate residents within targeted neighborhoods about the LRP with an estimated reach of 5,245 people.
  - Canvassed businesses in areas impacted by the LRP to raise awareness of the program among those businesses, answer questions and post LRP information in public areas at the businesses to increase customer awareness.

- Hosted four 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 on the LRP in El Comercio de Colorado, a prominent Spanish-language publication with an estimated circulation of 45,000 readers per issue.[89]
- Secured two articles on the LRP in Pueblo Catolico, a local Spanish-speaking language publication with an estimated circulation of 15,000 readers per issue.
- Included LRP information in their e-newsletter five times, with an estimated viewership of approximately 5,300 individuals.
- Posted LRP information, including videos, on Facebook 61 times with an estimated 8,915 views.

Sponsorship Awards

During the second 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 15 community events and at their Community Hubs, reaching 16,770 people.
  - Promoted the LRP in their October newsletter, with an estimated readership of approximately 13,000.
- The Center for African American Health offers resources that support communities in overcoming the root causes of health problems so they can maximize their individual and family health.
  - Promoted the LRP on social media platforms including Facebook (3,300 followers), LinkedIn (464 followers), Twitter (501 followers) and Instagram (803 followers).
- Tepeyac Community Health Center is a nonprofit community health center whose mission is to inspire health, wellbeing and humanity in the Denver community, through all of life's stages.
  - Promoted the LRP at 33 community events reaching approximately 1,440 people.
  - Integrated LRP content into the rotating digital message board in their clinic's lobby and waiting area.
  - Promoted the LRP on Facebook to their 2,700 followers.

[89] See Appendix HEJ-3 Ambassador Program Spanish Language Articles.

- Una Mano, Una Esperanza is a community organization that supported community outreach activities in the Athmar Park, Barnum, Barnum West, Mar Lee, Swansea and Westwood neighborhoods.
    - Promoted the LRP at 14 community events, such as food banks, school events and Una Mano, Una Esperanza service programs, reaching a combined total of 2,093 people.
    - Promoted the LRP on Facebook to their 3,300 followers.

Example of Partners in Action:

- In December, CREA Results participated in the Colorado Without Hunger event focused on the importance of quality food for children in public schools. Alongside other organizations, CREA ran a resource table at the event where they engaged with 150 attendees. Many attendees knew about the Lead Reduction Program, and some were looking for additional information and support. At least one customer was provided information on how to get a replacement water filter.

Materials

All customer-facing materials produced in 2024 have been translated into Spanish. The 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 and denverwater.org/Lead. Nine core program materials have also been translated into Vietnamese.

The Spanish version of the LRP website, 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 or visit denverwater.org/Plomo.

Early Childhood

Opportunities to spread LRP messaging to the early childhood community and providers continued during the second six months of 2024. Content about the LRP, filtering water, requesting a replacement filter if needed outside of the normal delivery timeframe and how to request a water test kit was included in the September edition of CDPHE’s “Our Voice” newsletter, which goes out to 1,532 subscribers in Colorado’s early childhood community. Additionally, a recorded interview with Denver Water overviewing the LRP and what customers need to know was included in the July issue of a podcast hosted by Early Learning Ventures, a Colorado-based nonprofit focused on helping childcare providers operate more efficiently and reach economies of scale.

In collaboration with Denver Water's Youth Education team, LRP messaging is integrated into Denver Water engagements with youth and their families. Community partner CREA Results continued 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 classroom visits where they engage students in hands-on learning activities.

Through collaboration with Denver Health, information on the LRP is being included in "Warm Welcome" bags for families with newborns at Denver Health. Approximately 350-400 Warm Welcome bags are distributed monthly.

HE&EJ Principles Applied to ALSLR Program [7.B.vii.a]

Denver Water provides its multicultural training program to ALSLR field observers and contractors annually. The training includes the following topics:

- Denver Water customer journey.
- 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.

A virtual community meeting was held in September targeted toward customers identified for upcoming service line replacement to share what to expect before, during and after construction. The meeting was fully bilingual, from the initial meeting promotion to the meeting presentation, poll questions and Q&A responses. The meeting recording is also available in Spanish and English at denverwater.org/Plomo and denverwater.org/Lead. Two additional meetings on construction preparedness were held earlier in 2024.

As needed, community partners support gathering signed consent forms in neighborhoods where they are focusing outreach efforts. Activities may include phone calls, emails and door-to-door canvassing to speak with relevant customers about providing consent. This has proven successful in the past, helping Denver Water to gain consent at properties otherwise unable to be reached despite multiple attempts, as well as identify commercial and abandoned properties to support updating records. This effort was not needed in the second half of 2024 but will continue to be employed as needed in 2025.

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. In 2024, Denver Water took additional efforts via phone calls and emails to contact refusal customers from previous years who were in or near previous work areas to gain consent for service line replacement. Similarly, additional phone calls and emails were

made to customers where an interior investigation of the service line was needed to confirm service line material. These outreach efforts were categorized by the type of refusal to provide a better explanation and level of understanding to customers as to why Denver Water needs and wants to conduct the replacement. This included further explanation of water testing results and a request for additional investigations to confirm whether or not the service line is lead. The team also continues to analyze the reasons for the refusal and if there are any types of barriers, identifying what Denver Water can do to overcome those barriers and provide equitable service to the customer to replace the lead service line. For most of these customers, the team was able to gain consent from the customer to conduct additional investigations for program removal or gain consent to conduct the service line replacement. Moving forward, the team will continue to evaluate customers that previously refused on an annual basis to prioritize outreach based on work areas for the year.

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

2025 ALSLR Plan

Planning for 2025 work areas began by using the LRP's prioritization model to target specific neighborhoods. The model is a risk-based approach that is used alongside long-term construction planning to account for the likelihood of LSLs in a given area, potential for health consequences, and logistical constraints or opportunities related to construction. If a neighborhood that was included in a previous work area aligned with the prioritization model, it was also included in 2025 ALSLR work areas. This continuity allows Denver Water to leverage existing community outreach and education efforts and continue work in neighborhoods with high program awareness and engagement. Additional neighborhoods were added based on the outputs of the prioritization model and construction feasibility.

As a result, 2025 ALSLR work areas include continuing replacements in seven neighborhoods (West Highland, Regis, Hale, Park Hill, Speer, Washington Park West, and Highland) and beginning replacements in three new neighborhoods (Berkeley, Washington Park, and Northeast Lakewood). Neighborhoods from previous years that are not included in the 2025 ALSLR work areas are either included in the Federally Funded Lead Service Line Program (FFLSLP) or will be monitored via the prioritization model for future years. The FFLSLP included work in five areas including continuing replacements in four neighborhoods (North Capitol Hill, Mar Lee, University, and Ruby Hill). FFLSLP areas used the same planning logic as ALSLR planning.

It is important to note that, due to logistical and construction constraints, properties from some neighborhoods included in previous ALSLR work areas may not have had their LSL replaced and will therefore require the replacement to be scheduled in the future. These properties are referred to as rollover properties. It is anticipated that the need for individual

replacements at rollover properties will increase over time based on constraints, such as paving moratoriums, future paving commitments, owner changes and delayed return of consent forms. These properties, including nonresponsive and refusal properties, will continue to be targeted for outreach and added to 2025 work areas when possible. Approximately 3% of all replacements in 2025 are anticipated to be performed as individual replacements at rollover properties.

The 2025 ALSLR work areas were reviewed with stakeholders, including the LRP Stakeholder Advisory Committee. Prior to the start of customer communications, notifications regarding upcoming work areas were communicated to elected officials, distributor partners and other key external stakeholders.

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

Per Section 7.B.vii.a of the 2022 Variance, Denver Water must report "a description of how the HE&EJ principles are being incorporated into the accelerated LSL replacement program, lead filter program, and communications, outreach and education plan."

Two virtual community meetings were held in June targeted toward customers enrolled in the Filter Program to reinforce proper filter use. The meetings were fully bilingual, from the initial meeting promotion to the meeting presentation, poll questions and Q&A responses. The meeting recordings are also available in Spanish and English at denverwater.org/Plomo and denverwater.org/Lead.

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.

Since 2023, the LRP team has been conducting direct outreach to leasing and property management offices with properties in the Filter Program using manually researched contact information to identify the best touchpoint for each property. Most of this effort in 2024 took place in the first six months of 2024. In total, phone calls and emails were made to 273 property contacts with a request to coordination on ensuring all tenants had pitcher filter kits, as well as signing consent forms and performing interior investigations where applicable. Of these, 34 (12.5%) requested additional filter kits, 78 (28.6%) signed consent forms, and 27 (9.9%) agreed to a request for an interior investigation to confirm service line material.

HE&EJ Principles Applied to Water Quality Sampling

Outreach around water quality sampling and encouraging customers to complete water test kits has been an ongoing area of learn by doing since the start of the program. As it applies to equity, in 2023, Denver Water worked with a community partner to conduct outreach in specific neighborhoods to encourage customers to return water samples and answer questions. This was moderately successful, but not pursued in 2024 due to staffing and lack of new appropriate neighborhoods for partner outreach. All communications related to water quality

sampling (offer letters, instructions, results letters, reminder emails and phone calls) continued to be provided in both English and Spanish.

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

Section 6.C of the 2022 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[1] 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.*
>
> *[1] For the purposes of this Order, 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 2022 Variance, dated Nov. 30, 2022.*

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

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

An area is defined as having HE&EJ concerns using EPA's EJScreen tool[90] 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
- Risk Management Plan 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 concern. Table 36 calculates the HE&EJ compliance metric for the 2024 program year. A total of 7,973 replacements were completed in 2024, with 4,092 (about 51%) of those replacements being within areas of HE&EJ concerns. The cumulative replacement rate within HE&EJ areas of concern is 10.2% and is higher than the overall cumulative replacement rate of 9.5%.

TABLE 36. HE&EJ COMPLIANCE METRIC CALCULATION FOR 2023

	Overall	Within Areas of HE&EJ Concern
Total Number of LSL Replacements Completed[1]	30,490[1]	17,002
Total Number of Properties with LSLs	63,955[2]	33,605[3]
Cumulative Annual Average Replacement Rate	9.5%	10.2%

[1] Total number of LSL replacements as of Dec. 31, 2024, since the inception of the program. Refer to Table 26.
[2] Total number of LSLs as of the 2019 Variance effective date (Jan. 1, 2020).
[3] 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 were mailed in September 2024 and met the required 95% outreach metric for both properties within the Filter Program and properties within areas of

[90] Refer to https://ejscreen.epa.gov/mapper/ for the EJScreen interactive map.

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: LRP PERFORMANCE USING THE EQUIVALENCY MODEL

Section 7.C of the 2022 Variance requires a "comprehensive evaluation of the LRPP performance using the equivalency model described in the LRPP with updated inputs based on actual LRPP implementation for: 90th percentile lead levels at LSL and copper with lead solder sites after operation of increased pH and alkalinity adjustment as CCT, number of LSL replacements conducted, filter adoption rate, and filter performance in the field." The metric is produced using actual performance data for various elements of the LRP to show the program "as implemented continues to be 'at least as efficient as' orthophosphate treatment in reducing lead exposure on an annual basis."

The equivalency model is a statistical model that compares modeled lead concentrations at each service line in the service area for conditions representing LRPP implementation versus the projected performance of orthophosphate, designated as OCCT. LRP conditions include the use of pH and alkalinity adjustment as CCT, accelerated LSL replacement (in addition to replacements routinely carried out as part of water main projects, emergency repairs and by third parties), pitcher filters for lead reduction prior to LSL replacement, and communications, outreach and education. Conditions for OCCT include the use of orthophosphate and the historical average rate of routine LSL replacements.

The equivalency model includes actual data from:

1) Lead concentrations from LCR compliance samples and customer requested samples at properties with copper plumbing and lead solder and other sites after operation of increased pH adjustment as CCT.
2) Number of LSL replacements conducted.
3) Filter adoption rate.
4) Filter performance in the field.

Integrating Data for Lead Levels into the Equivalency Model

The equivalency model uses actual lead levels measured from customer taps to represent lead levels from i) properties with copper plumbing and lead solder and ii) properties with no other known source of lead (i.e., non-lead in the LSL Inventory). Additionally, the model uses actual lead levels from filter performance sampling in the field to represent the reductions to lead levels at LSL homes that use a filter.

For properties with an LSL (i.e., confirmed LSL in the LSL Inventory), lead levels are represented by data collected from the pipe rack studies.[91] This was necessary because the only data available for orthophosphate treatment applied to LSLs were generated by the pipe rack

[91] See Lead Reduction Program Plan for a description of the pipe rack studies.

studies. This is a conservative approximation of lead release, as the pipe rack studies have been shown to release higher concentrations of lead than observed in the field.

Finally, to model lead levels after LSL replacement, the properties are treated as copper plumbing with lead solder because the premise plumbing may still contain lead.

Integrating the LSL Inventory into the Equivalency Model

The initial LSL Inventory and the inventory from Dec. 31, 2024, are used as an input to the equivalency model to evaluate performance. An overview of the LSL Inventory is provided in Table 15.

Integrating Filter Adoption and Performance into the Equivalency Model

The filter adoption rate is used in the equivalency model by randomly selecting the number of remaining LSLs equal to the adoption rate. For example, in 2024, there were an estimated 62,114 LSLs at the beginning of the year, with 7,973 being replaced by the end of the year.[92] The adoption rate of 83% is interpreted as 6,618 are filtered and 1,355 are assumed unfiltered.[93] These service lines are assigned lead concentrations randomly drawn from the observed distribution of lead in filter effluent generated from filter performance testing in the field. This reduces lead concentrations assigned to properties with an LSL and protected via the pitcher filter to concentrations far below the expected levels that would have occurred with only the addition of orthophosphate.

The results of the 2024 filter adoption survey were analyzed to identify sociodemographic factors that may correlate to lower or higher filter adoption. Using the survey results, efforts to target communities with lower adoption rates and address key themes from the survey are identified.[94]

The primary output of the model is an indexed performance of the LRP to the presumed OCCT conditions for each year, as shown in Figure 9. The index is calculated as the 90th percentile lead concentration from the LRP model divided by the 90th percentile lead concentration from the OCCT model. Results less than or equal to 1.0 demonstrate the LRP is “at least as efficient as” OCCT and in compliance with the Order. The points in Figure 9 reflect actual conditions each year (shown as a black X), the lines reflect projected numbers for future years (shown in solid red for the OCCT condition and dashed blue for the LRP condition).

Lead service line replacements for OCCT conditions are based on the historical rate of 1,200 replacements completed annually, which is assumed constant. For the LRP condition, there were 7,973 confirmed LSL replacements in 2024, with future LSL replacements assumed equal to the 7% mandated annual target (7% of 63,955 = 4,477). A filter adoption rate of 80%

[92] See Table 15.
[93] See the 2023 Annual Report.
[94] See Appendix A-3 Summary of Sociodemographic Indicators from 2022 Formal Filter Adoption Survey in the 2022 Annual Report.

was used for each future year based on the 2020 through 2024 filter adoption rates, and a filter adoption rate of 83% was used for 2024.

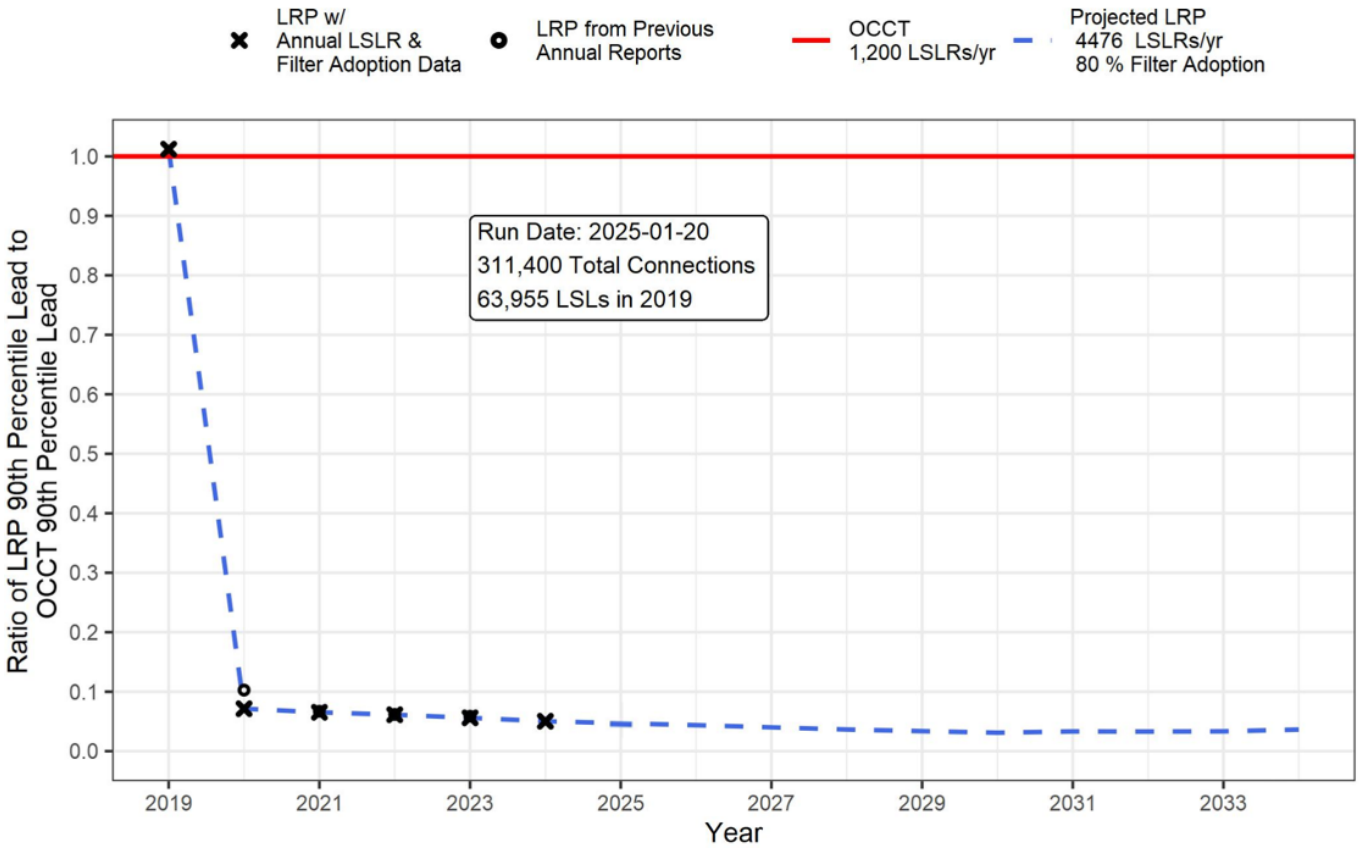

FIGURE 9. EQUIVALENCY MODEL OUTPUT FOR 2024

The model outputs of Figure 9 indicate that the LRP approach has resulted in system-wide lead concentrations that are less than 0.10 times the expected OCCT lead concentrations when measured at the 90th percentile. These results indicate that system-wide lead concentrations are lower than they would have been under OCCT conditions. Thus, better performance of the LRPP is demonstrated compared with OCCT for 2024. If the LRP continues to obtain these metrics into the future, the LRP should be more efficient than OCCT for the duration of the program, as shown by the dashed blue line.

The value provided in the past annual reports are shown with the black circles. This value differs from the current prediction because the most current water quality results and LSL replacement data were used. Although the additional LSL replacements were not counted toward the 7% target, they are counted in the model because they were verified to have happened in previous years.

The results of Figure 9 indicate that system-wide lead concentrations are lower than they would have been under OCCT conditions. Thus, Denver Water has again demonstrated better performance of the LRP compared with OCCT for 2024.

PART 4: 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 CCT). 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 Variance goals.

Methodology

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

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

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

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

The outcomes tracked in the Learning by Doing Log and the activities of the Stakeholder Advisory Committee are presented in this document. Preliminary Learning by Doing ideas were presented in the first semi-annual report of 2024. Efforts continue to use the Learning by Doing approach to address challenges and improve the effectiveness of the LRP.

Examples of Learning by Doing

Examples from Learning by Doing are organized by LRP element with examples related to HE&EJ identified separately. Each Learning by Doing example is presented by title, by the type of desired impact, and a description of the issue and opportunity for learning or change. As shown in Table 37, seven examples of Learning by Doing are included in this submission in addition to the examples included in the Semi-Annual Report for 2024.[95] The seven examples address improvements related to improving the customer experience, protecting public health and/or improving the efficiency of the LRP.

TABLE 37. OVERVIEW OF LEARNING BY DOING EXAMPLES

LRP Element	Number	Description	Desired Impact
Corrosion Control Treatment			Improve public health.
LSL Inventory	LBD-2	Implementing a self-reporting tool for customers to report their service line material.	Improve program efficiency. Improve customer experience.
ALSLR Program	LBD-3	Allowing contractors to make decisions when encountering difficult soils during replacement.	Improve program efficiency.
	LBD-4	Implementing water shut-offs at properties unresponsive to consent outreach.	Improve program efficiency.
Communications, Outreach and Education	LBD-5	Overlapping filter use outreach with multi-family property investigations to engage tenants.	Improve program efficiency.
	LBD-6	Sending post-replacement check-in mailers to continue engagement with customers.	Improve customer experience.
	LBD-7	Alerting customers of potential scammers posing as utility workers.	Protect customer safety.

Corrosion Control Treatment

LBD-1: Flushing customer service lines post-replacement.

Occasionally, post-replacement water quality sampling indicates higher levels of lead than expected. During the first three years of the program, customers were left with post-replacement flushing instructions and expected to conduct the flushing themselves. In 2023, contractors began performing the post-replacement flushing for the customer and this effort continued into 2024. Water quality results were compared for 2020-2022 (customer flushing) and 2023-2024 (contractor flushing). The lead results of the post-replacement water quality sampling had a

[95] See the Semi-Annual Report for 2022 submitted on July 8, 2022, and the Annual Report for 2022 submitted on Feb. 10, 2023.

lower average than when the customer flushed their service line, proving the contractor's efforts were beneficial to the customer's health.

LSL Inventory

LBD-2: Implementing a self-reporting tool for customers to report their service line material.

To increase the number of interior investigations performed under the LRP, Denver Water launched a customer self-reporting tool that allows the customer to aid in the identification of the material of their service line at the building's point of entry. After a robust QAQC process, the identified material is incorporated into the lead service line inventory. The QAQC process utilizes photographs as a means of verifying the service line material. The review of the initial reports showed that the customers required additional guidance on what part of the pipe the photograph should be focused on and the extent of the photograph. Additionally, it was determined that detailed instructions of how to find the point of entry was required. Language was added instructing the customer on how to find their point of entry using their meter or curb stop as a point of reference.

ALSLR Program

LBD-3: Allowing contractors to make decisions when encountering difficult soils during replacement.

Every so often, the contractor will run into difficult soils during the installation of a new service line, such as cobblestone and sand. When this occurs, the contractor loses the newly drilled hole when the drill auger is pulled back to the rig. After discussions with Denver Water, it was decided in 2024 that the contractor can make decisions on the means and methods when encountering difficult materials, rather than requiring additional approvals that may slow down the work. Allowing the contractor to do so improves the efficiency of replacement work at these sites, and therefore improves the customer's overall experience.

LBD-4: Implementing water shut-offs at properties unresponsive to consent outreach.

Since the inception of the program, there have been instances where a customer does not respond to the numerous consent outreach efforts (minimum of three attempts via two methods but typically at least two mailed consent forms and one in person attempt) and is therefore categorized as nonresponsive. Denver Water will continue to make many follow-up attempts throughout the life of the program, especially in circumstances where the property is located adjacent to an active work area. To prevent a large buildup of nonresponsive properties, Denver Water piloted water shut-offs in 2024 on a set of approximately 200 properties that were previously in an active task order and were nonresponsive. This process alerts the customer (both owner and tenant) that they need to respond to the consent form by a specified date, and if they do not, their water will be shut off. Two standard mailers are sent as part of this process. The first is sent approximately 45 days prior to a potential shut-off. The second is at least 15

days prior to a potential shut-off. If a property is still nonresponsive after these two additional attempts, a property is scheduled for a robocall notification one week prior to shut-off noting the date of scheduled shut-off. Finally, a property will have a shut-off performed if they are still nonresponsive at the end of this process and have not signed a consent form and scheduled a replacement with contractor. Only one property was shut off for non-response to Lead Service Program in 2024. The water was off for less than a day before the homeowner engaged with the program for a replacement. Denver Water saw a lot of success with this initiative in 2024 and is working toward making the process more efficient and smoother as lessons are learned are incorporated for full-scale implementation in the 2025 program year. To improve the timing of notices, the shut-off lists have begun to be incorporated into the overall 2025 notification schedule.

Communications, Outreach and Education

LBD-5: Overlapping filter use outreach with multi-family property investigations to engage tenants.

From the start of the program, engaging tenants, particularly around filter use, has been an area of continued work and learning by doing. In 2023 and 2024, Denver Water identified an opportunity to overlap filter use outreach with multi-family property investigations to streamline the process, both for Denver Water and the customers. To accomplish this, multi-family properties where outreach is needed for 1) investigations and 2) tenant filter use are identified, and the LRP Team conducts the outreach for both purposes. This involves manually researching contact information, as opposed to the information typically available in CC&B and contacting the customer.

LBD-6: Sending post-replacement check-in mailers to continue engagement with customers.

Based on results of a twice-yearly customer survey, some customers felt they did not know what to expect after a service line replacement. While information is already left with the customer that describes what to expect post-replacement, there is a gap in time between the completion of the replacement and the next touchpoint, four months later, when the post-replacement water quality test offer arrives. To keep the customer engaged throughout the entire process, the COE team designed a check-in mailer to send to customers approximately a month after replacement to outline what customers should expect over the next few months. These reminders include continuing to use filtered water until six months post-replacement and expecting a water quality test offer in the mail approximately four months post-replacement.

LBD-7: Alerting customers of potential scammers posing as utility workers.

There have been documented instances of people posing as utility workers to gain entry into a customer's home or to steal information from the customer. Over the years, Denver Water has put out information on avoiding these scams. However, there is an opportunity to further highlight the issue and provide important guidance for customers, especially in the light of the

increasing occurrences of these scams. Therefore, Denver Water has posted information on the Nextdoor app and created a page the Denver Water website (denverwater.org/SpotScams) to serve as a single reference for customers. Denver Water also ran Spanish-language Public Service Announcements on Spanish radio stations and in a TAP article to raise awareness of the issue and provide guidance on how customers can protect themselves.

Stakeholder Advisory Committee

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

A list of 2024 committee members was included in the First Semi-Annual Report for 2024. The Stakeholder Advisory Committee was convened quarterly in 2024. An outline of meeting dates, primary topics and outcomes is shown in Table 38.

TABLE 38. SUMMARY OF 2023 STAKEHOLDER ADVISORY COMMITTEE MEETING TOPICS

Meeting Date	Primary Topics	Outcomes and LRP Modifications
Feb. 8, 2024	• Overview of LRP progress in 2023. • Update on LRP progress in 2024. • Update on 2024 tactics • Overview of Lead and Copper Rule Revisions vs. Lead and Copper Rule Improvements.	In addition to hearing from Denver Water about LRP progress, committee members were able to hear about updates in tactics for 2024, including the water shut-off pilot. The committee asked insightful questions about how the pilot will be conducted and if there will be exceptions for situations such as tenant-occupied properties. Denver Water was able to confirm this nuance in its approach.
May 30, 2024	• Update on LRP progress in 2024. • Update on tenant signature for consent forms. • Overview of lessons learned related to multifamily outreach.	Committee members asked questions about any complaint levels regarding water quality following the pH adjustment and about the timing for allowing tenants to sign the service line replacement consent form. Denver Water was able to answer these questions, including showing fewer complaints across the system following the pH adjustment. Members expressed interest in an opportunity for a service line replacement site visit.
Oct. 3, 2024	• Lead service line replacement site visit.	Committee members noted seeing a service line replacement firsthand increased their knowledge and understanding of the process, further empowering them to effectively communicate about the LRP with their networks.
Dec. 4, 2024	• Update on LRP progress in 2024. • Overview of recent engagement with EPA, including a webinar and service line replacement site visit. • Preview of 2025 activities and work areas.	Committee members asked questions about the future of federal funding and how to access the new online self-reporting tool to identify service line material.

In 2025, the goal for the Stakeholder Advisory Committee is to meet twice yearly with an additional site visit to a location relevant to the LRP, such as Denver Water's new Northwater Treatment Plant where the pH adjustment can be highlighted. The makeup of the committee is expected to remain the same, with the potential addition of new organizations as appropriate.

DEVIATIONS AND CLARIFICATIONS

Under paragraph 7.C of the Variance, Denver Water is required to "document any deviations from the LRPP during the most recent Program year." During the 2024 Program Year, input was sought from EPA on clarifications and, in certain instances, permission to deviate from the Order to address the administration of the LRP, as summarized below.

Deviations

- There were no deviations from the Variance in the 2024 Program Year.

Clarifications

- There were no clarifications on the Variance in the 2024 Program Year.