DENVER WATER LEAD REDUCTION PROGRAM

SEMI-ANNUAL REPORT – S2 2021

Version 1.0: January 7, 2022

Presented by: Denver Water

DENVER WATER

ISSUE AND REVISION RECORD

Version	Date	Originator	Checker	Approver	Description
1	1/7/2022	LRP Team	Erika Ellman & Quirien Muylwyk	Alexis Woodrow & Dan Fourness	Formal submission

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PART 1: INTRODUCTION

Denver Water is committed to significantly reducing the lead exposure levels to customers from lead service lines and plumbing. The Lead Reduction Program provides a holistic and permanent lead reduction approach that will significantly reduce lead exposure to our customers and be less harmful to the environment. In December 2019, Denver Water began the process of implementing the Lead Reduction Program Plan in accordance with the EPA's Dec. 16, 2019, Variance and the Nov. 15, 2019, letter from CDPHE regarding conditional approval of Denver Water's request for modification of optimal corrosion control treatment (OCCT).

This semi-annual report was prepared in compliance with paragraph 7.B of the Variance and commitments made by Denver Water in the 2019 Lead Reduction Program Plan. The report addresses the second six months of 2021 for the period of June 5 through Dec. 3, 2021. During this time period, Denver Water has provided six monthly reports for June 2021, July 2021, August 2021, September 2021, October 2021, and November 2021 to CDPHE. This report includes data and information from these monthly reports, as well as additional reporting as required by the Variance for the semi-annual reports.

What to Expect: Reporting on Program Activities

The purpose of the semi-annual (and subsequent annual) reports is to document the implementation of the Lead Reduction Program, describe the actions taken by Denver Water to reduce lead levels and support the subsequent evaluation of the Lead Reduction Program in anticipation of an extension to the Variance request beyond three years.

The performance data included for the different elements of the Lead Reduction Program described in this semi-annual 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 shown for the second six months of 2021 include the period of June 5 to Dec. 3, 2021, with a few exceptions to either provide additional information not included in previous reports or to align with other reporting timelines (for example, with Lead and Copper Rule six-month reporting periods).

TABLE 1. WHAT TO EXPECT IN THIS SEMI-ANNUAL REPORT

Paragraph (and LRP Task)	What to Expect in this Semi-Annual Report and Status
7.B.i CCT	This section includes a summary of results previously submitted in the six monthly reports[1] for June, July, August, September, October, and November 2021.
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 Sept. 29, 2021, using data current up to Sept. 24, 2021.
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 2021.
7.B.v Compliance Metrics	The Equivalency Model is updated using data collected for the program year and is presented in the annual report.
7.B.vi Communications, Outreach and Education	This section describes implementation of the 2021 COE Plan,[2] 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 2021 COE Plan, updates on community partnerships, and outreach.
Additional Requirements and Miscellaneous Deliverables	This section summarizes submissions to EPA and CDPHE identified in the LRPP.[3]
Appendices	Appendices include CCT, LSL inventory, water quality results, LSL replacements, customer refusal lists, COE and HE&EJ.

ALSLR = Accelerated Lead Service Line Replacement
CCT = Corrosion Control Treatment
COE = Communications, Outreach and Education
HE&EJ = Health Equity and Environmental Justice
LRPP = Lead Reduction Program Plan
LSL = Lead Service Line

[1] See Appendix REG-2 Copies of Letters for Compliance-Related Submissions (Second Six-Month Period of 2021).
[2] See Appendix COE-H.1 in the 2020 Fourth Quarterly Report (submitted Jan. 8, 2021).
[3] See Appendix REG-2 Copies of Letters for Compliance-Related Submissions (Second Six-Month Period of 2021).

TABLE 2. DATES FOR DATA INCLUDED IN THE SECOND SEMI-ANNUAL REPORT FOR 2021

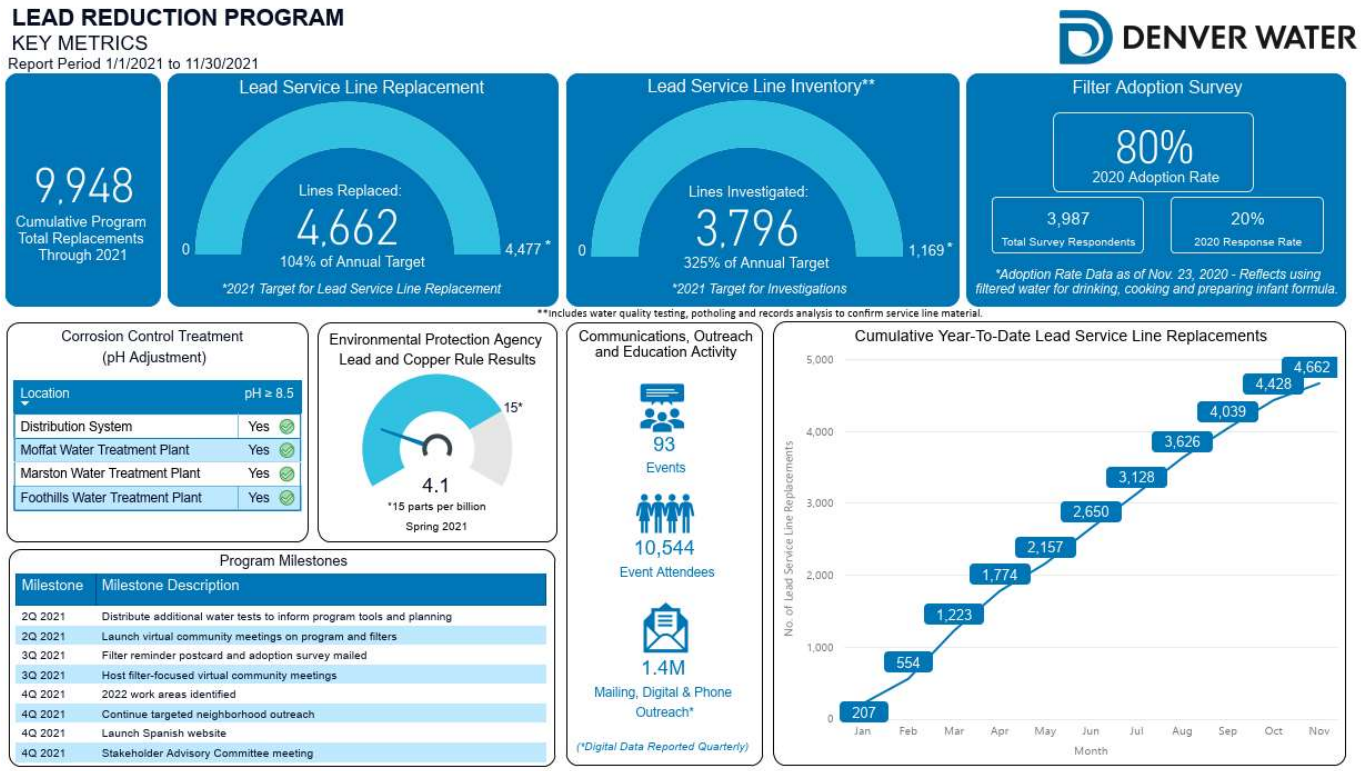
Description	First Semi-Annual Report (2021)	Second Semi-Annual Report (2021)
CCT pH/alkalinity Adjustment Start-up	All three WTPs have the capability to adjust pH	All three WTPs have the capability to adjust pH
LCR 90th Percentile Lead Concentration based on Compliance and Customer Requested Samples	All LCR samples collected from Jan. 1 to June 30 All customer requested samples reported in LIMS[1] between Jan. 1 and June 30	All LCR samples collected from July 1 to Dec. 31 All customer requested samples reported in LIMS between July 1 and Dec. 31
Elevated Lead Response Reporting	Jan. 1 to June 4	June 5 to Dec. 3[2]
Water Quality Sampling from Select Households (1983 to 1987 Homes)	Jan. 1 to June 4	June 5 to Dec. 3
Inventory – Posting of Map to Denver Water's Website	Data through June 4 Posted June 30	Data through Sept. 24, 2021 Posted Sept. 29, 2021
Inventory – Update	Jan. 1 to June 4	June 5 to Dec. 3
Investigations – Verification Potholing as Part of ALSLR Program	Jan. 1 to June 4	June 5 to Dec. 3
Investigations – Investigative Potholing Independent of ALSLR Program	Jan. 1 to June 4	June 5 to Dec. 3
Investigations – Water Quality Sampling as part of ALSLR Program (not included in 90th Percentile Calculation)	All results reported in LIMS from Jan. 1 to June 4	All results reported in LIMS by Dec. 3
Investigations – Water Quality Sampling Independent of ALSLR Program (not included in 90th Percentile Calculation)	All results reported in LIMS from Jan. 1 to June 4[3]	All results reported in LIMS by Dec. 3
Water Quality Sampling Post-LSL Replacement	All results reported in LIMS from Jan. 1 to June 4[3]	All results reported in LIMS by Dec. 3
ALSLR Program Replacements	Jan. 1 to June 4	June 5 to Dec. 3
ALSLR Program Consent Forms	Jan. 1 to June 4	June 5 to Dec. 3
Initial Filter Distribution	Jan. 1 to June 4	June 5 to Dec. 3
Replacement Filter Distribution	Jan. 1 to June 4	June 5 to Dec. 3
Filter Program Occupancy Changes[4]	Jan. 1 to June 4	June 5 to Dec. 3
Informal Filter Adoption Survey as Part of ALSLR Program	Jan. 1 to June 4	June 5 to Dec. 3
Filter Testing in the Field	Jan. 1 to June 30	July 1 to Dec. 31
COE Activities	Jan. 1 to June 4	June 5 to Dec. 3

[1] LIMS is the Laboratory Information Management System used by Denver Water.
[2] For samples collected and reported in LIMS by Dec. 3 and follow-up response by Dec. 3, 2021.
[3] See December 2020 monthly report for sample results reported in LIMS between Dec. 4 and 31, 2021.
[4] Includes occupancy changes at ALSLR properties by definition.

Summary of Key Performance Indicators Year-to-Date

Denver Water uses a dashboard to communicate key metrics to share the progress of the Lead Reduction Program with the public. The dashboard was posted on the Denver Water website on Dec. 16, 2021, in both English and Spanish, including data through Nov. 30, 2021.[4] The dashboard can be accessed from the Denver Water website at: https://www.denverwater.org/your-water/water-quality/lead/dashboard

FIGURE 1. DASHBOARD AS POSTED TO THE DENVER WATER WEBSITE (DATA TO NOV. 30, 2021)



[4] See the 2020 Second Quarterly Report for an explanation of the metrics used in the dashboard.

PART 2: REQUIRED REPORTING

7.B.i CCT

Section 7.B.i of the Variance addresses Denver Water's CCT recordkeeping and reporting requirements for the second half of 2021 for the following parameters:

> *i. CCT*
>
> *a. within 90 days of the Effective Date, an elevated lead response plan for approval by CDPHE and EPA in accordance with requirements of paragraph 2.B.iv.*
>
> *b. 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;*
>
> *c. 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;*
>
> *d. CCT water quality parameters for pH and alkalinity, reported monthly no later than the tenth day of the following month; 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, reported monthly no later than the tenth day of the following month.*
>
> *Text is taken verbatim from the Order, dated Dec. 16, 2019.*

Denver Water uses a combination of water quality parameters and lead sampling results to report the performance of Corrosion Control Treatment. Information that was previously reported as part of the Monthly Reports for June through November 2021 is not included in this report with the exception of a summary of some of the data.

During this reporting period, Denver Water continued to operate at or near a pH of 8.8 at all three plants. Denver Water also submitted several miscellaneous reports to CDPHE and EPA as required in the LRPP as described in Table 3.

TABLE 3. OVERVIEW OF 7.B.I REQUIREMENTS

Paragraph Reference	Description	Refer to
7.B.i.a	Submit Elevated Lead Response Plan by March 30, 2020, per paragraph 2.B.iv.	Submitted as part of Implementation Plan. Approved July 17, 2020.
7.B.i.b	Notify CDPHE of elevated lead levels and actions taken by Denver Water to reduce lead exposure.	See Table 4 and Appendix.[5]
7.B.i.c	Lead sampling results per the Lead and Copper Rule and from customer requested sampling.	See Table 5 (90^{th}P to date). See monthly reports[6] for June through December 2021 submitted previously.
LRPP III.E (p 70)	Monthly trending of LCR compliance samples and customer requested samples.	See monthly reports[6] for June through December 2021.
7.B.i.d	CCT parameters for pH and alkalinity, reported monthly.	See Table 6. See monthly reports[6] for June through December 2021. CDPHE confirmed setpoints on June 9, 2021.[7]
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 90^{th} percentile lead concentration.	See Table 7 and monthly reports for June through December 2021.[6] See Table 8.
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 Table 9.
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. 23, 2021.

[5] See Appendix CCT-5 Summary of Response to Elevated Lead Levels (Second Six-Month Period of 2021).
[6] See Appendix REG-2 Copies of Letters for Compliance-Related Submissions (Second Six-Month Period of 2021).
[7] See Letter from CDPHE to Denver Water. See also Optimal Corrosion Control Treatment Parameters for Denver Water, submitted to CDPHE on May 5, 2021.

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-program under which the sample was collected is reported in LIMS, including Lead and Copper Rule 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.

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

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 provides a description in the monthly report of actions taken when this occurs.

All customer requested samples above 25 µg/L analyzed by month during the second half of 2021, are listed in Table 4; a detailed summary of responses is provided in the monthly reports for all properties reviewed as part of the Elevated Lead Response Plan.[8] A lead result over 25 µg/L in the first sample bottle for a customer 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 samples during the reporting period for the second six months of 2021.

TABLE 4. COUNT OF PROPERTIES WITH ELEVATED LEAD CONCENTRATIONS IN LCR AND CUSTOMER REQUESTED SAMPLES[1]

Description (Based on Sampling Date)	July 2021	Aug 2021	Sept 2021	Oct 2021	Nov 2021	Dec 2021	Response
Properties with Lead >25 µg/L in first 1 L sample bottle	2	3	1	0	1	0	Reported to CDPHE within 10 days and again in monthly report. See Appendix.[10]

[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 elevate lead are described in Appendix CCT-5 per the definition used in the Order. Data reflect samples analyzed by Dec. 3, 2021, with actions updated through Dec. 2, 2021.

[8] See Appendix CCT-5 Summary of Response to Elevated Lead Levels (Second Six-Month Period of 2021) for elevated lead measured in the first bottle of the 3-bottle test.
[9] See Corrosion Control Implementation Plan re-submitted to CDPHE on June 4, 2020.
[10] See Appendix CCT-5 Summary of Response to Elevated Lead Levels (Second Six-Month Period of 2021).

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

Data for LCR compliance and customer requested sampling are provided in the individual monthly reports for July through December 2021.[11] Data used to calculate the 90th percentile lead concentration in the second semi-annual report align with reporting requirements of the LCR. This value may be updated by CDPHE pending their review of data used to calculate the 90th percentile lead concentration for LCR reporting needs.

The cumulative 90th percentile lead concentration for LCR compliance samples for the Fall 2021 compliance period (July 1 through Dec. 31, 2021) is presented in Table 5. Denver Water staff continues to collect LCR compliance samples inside customer homes.

TABLE 5. SUMMARY OF LCR 90TH PERCENTILE LEAD CONCENTRATIONS (JULY 1 TO DEC. 31, 2021)

LCR Compliance Results for Lead – Fall 2021 Compliance Period	Result	Number of Homes
LCR Compliance 90th Percentile Lead[1]	4.5 µg/L	110
Overall 90th Percentile Lead Concentration using LCR Compliance + Customer Requested Samples[2]	4.3 µg/L	533 (110 + 423)

[1] 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 and Dec. 31, 2021, compliance period. This number matches the December monthly report.
[2] Includes results from customer requested samples reported in LIMS between July 1 and Dec. 16, 2021 and submitted via the monthly reports. Sampling to support the ALSLR Program is excluded from the compliance calculation by definition. This number matches the December monthly report.

Results from customer requested sampling are included in the overall 90th percentile lead concentration reported in Table 5 and detailed calculations are available in the monthly reports.

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

Chemical feed systems were brought into service for enhanced pH corrosion control treatment 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 are included in monthly reports since Jan. 1, 2020; operating data with adjusted pH are included in the monthly reports since March 2020. Data for pH in treated water from the active water treatment plants and the distribution system are summarized in Table 6 based on the lowest daily average pH measured each month from each sampling point. On Aug. 13, 2020, Denver Water wrote to CDPHE that steady state performance of corrosion control treatment 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 was 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

[11] See Appendix REG-2 Copies of Letters for Compliance-Related Submissions (Second Six-Month Period of 2021).

distribution system, and alkalinity greater than or equal to 20 mg/L as $CaCO_3$, all effective July 1, 2021.[12]

TABLE 6. MONTHLY DAILY AVERAGE MINIMUMS FOR WATER QUALITY PARAMETERS[1]

Description	July 2021	August 2021	September 2021	October 2021	November 2021	December 2021
Variance Requirement	pH ≥ 8.5 in all parts of the system.					
Marston Water Treatment Plant Effluent	8.8	8.8	8.8	8.8	8.8	8.9
Foothills Water Treatment Plant Effluent	8.8	8.8	8.8	8.8	8.8	8.9
Moffat Water Treatment Plant Effluent	8.8	8.8	8.7[2]	NA	NA	NA
Distribution System	Not applicable, however pH levels in the distribution have been above 8.5 since March 12, 2020.					

[1] See monthly reports submitted previously for detailed pH data.
[2] The Moffat Water Treatment Plant went offline Sept. 8, 2021 for the winter season.

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

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 possible lead to known lead[13]). The 3-bottle test is performed[14] at properties in the City and County of Denver and the distributors:

- To confirm the service line material before LSL replacement at properties included in the 2021 ALSLR Program Task Orders where lead has not been confirmed (i.e., p-value < 1[15]).
- To inform the inventory and predictive model at properties in the City and County of Denver with a suspected (i.e., p-valve ≥ 0.8 and < 1) or possible lead service line (i.e., p-value of 0.5 to 0.8).
- To support the designation of the service line material at all single-family residential properties within a distributor boundary identified with a suspected or possible lead service (i.e., p-value of 0.5 or higher).[16]
- To validate customer comments on the presence (or absence) of a lead service line and requests to opt in (or out of) the LRP.

[12] See Appendix REG-2 Copies of Letters for Compliance-Related Submissions (Second Six-Month Period of 2021).
[13] See discussion in Section 7.B.ii LSL Inventory.
[14] See individual monthly reports for details and results for pre-LSL replacement sampling efforts.
[15] 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.
[16] This approach applied to all distributors with one exception. Sampling kits were delivered to 500 residential properties in Consolidated Mutual, although any customer can request a sample kit.

Lead results over 3 µg/L in the second or third sample bottle will trigger a review of inclusion in the LRP, and the property will be added to the list for LSL replacement and added to the Filter Program if not already enrolled.[17]

TABLE 7. SUMMARY OF WATER QUALITY RESULTS[1] PRE-LSL REPLACEMENT AT SINGLE-FAMILY RESIDENCES USING THE 3-BOTTLE TEST

Water Quality Sampling for Investigation (pre-LSL Replacement)	Result for 2021 Year-to-Date	Unit
Total Number of Kits Mailed Out[2]	19,442	Kits
Total Number of Kits Received and Analyzed to Investigate the Service Line Material[3]	5,904	Kits
Maximum Lead Concentration Measured Year-to-Date[4]	274.5	µg/L
Average Lead Concentration (in second and third bottles only)[5]	1.3	µg/L

[1] Results from pre-LSL replacement sampling from investigation, verification, and customer requested sampling are included in monthly reports. Data reported in LIMS between Dec. 4 and 31, 2021, can be found in the December 2021 monthly report.
[2] If a sampling kit is re-sent to a property, it is counted twice.
[3] As reported in LIMS by Dec. 3, 2021 for sample kits from samples collected in 2021 are included in the metric.
[4] The highest value measured in either the first or second six months of 2021 was 274.5 µg/L (measured in Bottle 1 in August 2021). The property was included in the 2021 pre-LSLR investigative water quality sampling effort. As part of follow-up efforts, the review of records revealed that the service line was replaced in 2012. The customer confirmed that they are using the filter and suggested that time away from the property may have resulted in sample collection after an extended period of no water use. A follow-up water quality kit was sent to the property in September 2021; additional follow-up is underway to re-sample the property as the kit was not returned for analysis. Pre-LSLR samples, although managed in accordance with the Elevated Lead Response Plan, are not documented in Appendix CCT-5.
[5] If a value was reported as less than the detection limit (i.e., < 1 ppb) 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]

Water quality sampling is offered to all customers approximately four months after LSL replacement. For LSL replacements completed prior to Dec. 31, 2019, letters were mailed to customers to offer post-replacement sampling four months after LSL replacement to single-family, 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 four 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.

[17] 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.

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. 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 8. As of July 2021, only those single-family properties with replacements completed by Denver Water Transmission and Distribution (T&D) crews automatically receive a 3-bottle sampling kit, with offer letters continuing to be mailed to all other residential, multi-family and commercial properties.

TABLE 8. SUMMARY OF POST-REPLACEMENT SAMPLING OFFERS AND WATER QUALITY (THROUGH DEC. 3, 2021)

Water Quality Sampling after LSL Replacement	Count[1]						
	July 2021	August 2021	September 2021	October 2021	November 2021	December 2021	TOTAL
Total Number of Letters Mailed to Offer Post-LSL Replacement Sampling[2,3]	633	473	338	452	563	0	2,459
Total Number of Kits Mailed Out[2,3]	156	129	185	147	199	21	837
Total Number of Kits Received and Analyzed to Confirm post-LSL Replacement Water Quality[2,4]	55	56	35	24	18	0	188
Total Number of Kits Received and Analyzed to Confirm post-LSL Replacement Water Quality Not Previously Reported	45[6]	0	0	0	0	0	45
Number of Properties with Lead > 15 µg/L in First Bottle[2] (triggers additional investigation effort)	0	0	0	0	0	-	0
Number of Properties with Lead ≥ 5 and < 15 µg/L in the Second and/or Third Bottle[5] (triggers additional investigation effort)	0	0	1	0	0	-	1
Number of Properties with Lead ≥ 5 and < 15 µg/L in First Bottle[2] (triggers customer education)	3	1	1	0	0	-	5

[1] Counts are based on the month of sample collection, per the Order. 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] Total number of kits analyzed refers to results available in LIMS by Dec. 3, 2021 with samples collected since July 1, 2021.

[5] Applies to single-family residences only.

[6] Includes samples collected in May and June 2021 not previously reported in the First Semi-Annual Report for 2021.

During this reporting period, 188 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. A detailed list of properties that did not receive the offer and explanation is provided in Appendix CCT-7, including follow-up activities.[18]

Post-replacement sampling offer letter mailing lists 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 lead service line four months prior to the month the mailing list is created. The QA/QC process to determine valid addresses includes evaluating who completed the replacement (i.e., Denver Water T&D crews or ALSLR contractors), if the property is CASS[19] 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 formula-fed infant/child up to 24 months of age resides in a Select Household, upon customer request Denver Water must offer free drinking water lead testing. If 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 to last the customer until the child at the Select Household exceeds the age of 24 months. Denver Water will develop and implement a communications, outreach and education program focused on Select Households to make them aware of the opportunity for testing and filters.*
>
> *Text is taken verbatim from the Order, dated Dec. 16, 2019.*

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.

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

[19] 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.

Outreach for water quality sampling in 1983 to 1987 homes was initiated in fall 2020 and resulted in sample requests through early 2021 that were reported in the first 2021 semi-annual report. Follow-up outreach to those properties was conducted in November 2021 to remind customers of the opportunity to request a free water quality sampling kit if they have a formula fed infant in the home. Of the 36,723 customers contacted in 2021, 159 sample kit requests were received, and 62 sample kits were subsequently returned and analyzed. Lead was measured greater than 3 µg/L in the first bottle from three properties, none of which identified as a household with a formula-fed infant and therefore no new properties defined as a select household were enrolled in the Filter Program. [20] Results recorded in LIMS by Dec. 3, 2021, are presented in Table 9.

TABLE 9: SUMMARY OF WATER QUALITY RESULTS FROM SELECT HOUSEHOLDS

Year	Number of Customers Contacted by Mail	Number of Customer Requested Samples[1]	Number of Kits Received and Analyzed for Lead[2]	Number of Properties with Lead > 3 µg/L	Number of Properties Self-Identified with Formula-fed Infant and Enrolled in Filter Program[3]
2020	38,477	319	150	7	2
2021	36,723	159	62	3	0

[1] Number of Customer Requested Samples is based on the Test Kit Sent Date.
[2] Total number of kits analyzed refers to results available in LIMS by Dec. 3, 2021.
[3] Select Households receive enough replacement filter cartridges to meet the formula preparation needs for infants up to 24 months and distribution of additional replacement filter cartridges are not provided as part of the Filter Program.

Voluntary 5th L Sample Collection

During the Fall 2021 LCR compliance sampling round, technicians collected five 1 L sequential samples at six randomly selected properties with a lead service line included in the LCR study pool in preparation for new sampling protocols described in the EPA Lead and Copper Rule Revisions (LCRR) published in January 2021. Results are shown in Figure 2. Lead was measured <1.0 µg/L in the 5th L at three of the six properties with mixed results observed at the remaining properties (with either more or less lead measured in the 5th L). The results of Figure 2 were compared to results described in the Lead Reduction Program Plan which included sampling using ten sequential samples. While the 5th L data from the Fall 2021 LCR compliance sampling was not as conclusive as the Spring 2021 5th L sampling, the 5-L profile sampling suggests the first draw (i.e., the compliance sample under the existing Lead and Copper Rule) does not capture the highest lead concentrations within a service line. All results were less than 10 µg/L. All results are an early indication that the CCT component of the LRP is effective and CCT practices are expected to meet the needs of the LCRR.

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

FIGURE 2. RESULTS FROM LEAD RELEASE PROFILES USING FIVE 1 L SAMPLES (NON-COMPLIANCE SAMPLES COLLECTED DURING FALL 2021 LCR SAMPLING PERIOD)

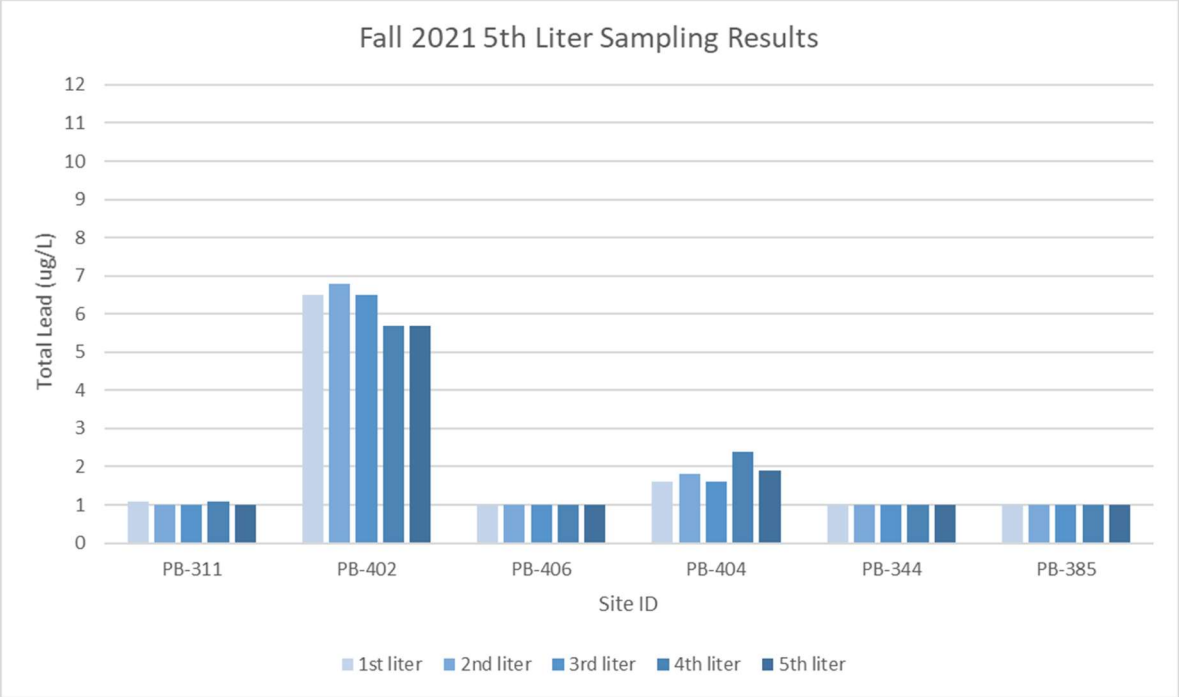


TABLE 10. OVERVIEW OF 5TH LITER SAMPLING DATA IN 2021

Voluntary 5th L Sampling in 2021	Count
Total Number of Properties Sampled for 5th L	16
Number of Samples Collected	80
Number of Properties with no Impact in 5th L concentration	6
Number of Properties where the 5th L < 1st L concentration	3
Number of Properties where the 5th L > 1st L concentration	7

7.B.ii LSL Inventory

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

> *ii. LSL Inventory.*
>
> *a. total number of service lines;*
> *b. the total number of replaced LSLs during the variance;*
> *c. the total number of known, suspected, and possible LSLs;*
> *d. the total number of unlikely LSLs;*
> *e. the total number of non-LSLs, indicating the number designated as non-LSLs solely based on statistical factors;*
> *f. the number of Investigations conducted each year, demonstrating that the minimum 1.4% verification rate has been met;*
> *g. an updated service line inventory map; and*
> *h. 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 Order, dated Dec. 16, 2019.*

An overview of the LSL Inventory reporting requirements is shown in Table 11.

TABLE 11. OVERVIEW OF 7.B.II REQUIREMENTS

Paragraph Reference	Description	Refer to
3.A	Complete initial LSL Inventory no later than 35 days after the effective date.	Submitted Feb. 5, 2020.[21]
3.C	Publication of LSL Inventory no later than 70 days after the effective date.	Re-posted on Sept. 29 using data through Sept. 24, 2021.
7.B.ii.a	Total number of LSLs.	Refer to Table 12. See Appendix. [22]
7.B.ii.b	Total number of replaced LSLs during the Variance.	Refer to Table 13.
7.B.ii.c	Total number of known, suspected and possible LSLs.	Refer to Table 12.
7.B.ii.d	Total number of unlikely lead.	Refer to Table 12.
7.B.ii.e	Total number of non-lead service lines. Total number of non-lead determined solely by statistical methods.	Refer to Table 12. Described after Table 12.
7.B.ii.f **3B, 3.D**	Number of investigations that supports a determination of the material of the service line and that are performed independently of a LSL replacement or not at the request of the customer.	Refer to Table 18.
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.	See Section 7.B.vii.
7.B.ii.g	Updated LSL Inventory Map.	https://www.denverwater.org/your-water/water-quality/lead
7.B.ii.h	Rationale for change to status of the service line in the LSL Inventory.	See Appendix.[23]

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

The initial LSL Inventory designating known, suspected, and possible LSLs was submitted on Feb. 5, 2020. The base LSL Inventory was updated using additional information and further analysis of the data presented in the September 2019 LRPP (see Table 12). Adjustments to the status of a service line (i.e., lead or non-lead) are made based on a desktop assessment completed with Denver Water records, customer records, and individual distributor records (i.e., total service, read and bill, and master meter); potholing results; and water quality sampling results. The information presented in Table 12 is used to compare the current understanding of the inventory with the original base 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. Therefore, the total number of "known lead" service lines includes the number

[21] See Appendix REG-2 Copies of Letters for Compliance-Related Submissions (Second Six-Month Period of 2021).
[22] See Appendix INV-5 Summary of Service Line Status and p-Value (Second Six-Month Period of 2021).
[23] See Appendices INV-6A Line by Line p-Value Changes: Status Descriptions and Notes (Second Six-Month Period of 2021) and INV-6B Line by Line p-Value Changes by Status (Second Six-Month Period of 2021).

of properties with a known lead service that remain in the ground and those that have been replaced by the LRP.

TABLE 12. LEAD SERVICE LINE INVENTORY AS OF DEC. 3, 2021

Status of Service Line	Sept. 6, 2019 Submittal (Aug. 8 2019 Data) BASE INVENTORY[1]	Feb. 5, 2020 Submittal (Jan. 28 2020 Data)	Jan. 29, 2021 Submittal (Dec. 30 2020 Data) 2020 ANNUAL REPORT[2]	July 9, 2021 Submittal (June 4 2021 Data)	Jan. 7, 2022 Submittal (Dec. 3, 2021 Data) CURRENT INVENTORY[3]
Known Lead	1,066	1,149	7,507[5]	10,242[5]	13,076[5]
Suspected Lead	61,374[4]	60,549[4]	54,178	51,635	48,616
Possible Lead	22,106[4]	21,788[4]	19,894	19,469	18,611
Unlikely Lead	89,388	90,745	88,475	88,260	88,101
Non-lead	145,766	146,528	150,642[6]	151,052[6]	152,271[6]
Total Number of Services	319,700	320,759	320,696	320,658	320,675
TOTAL ESTIMATED Number of Lead Service Lines	**63,955**	**63,195**	**63,211**	**63,599**	**63,456[7]**

[1] The "base inventory" is the basis for the 7% LSL replacements per year.

[2] The "year end inventory" is used in the application of the equivalency model to evaluate the performance of the LRP.

[3] The "current inventory" is the basis of enrollment in the Filter Program (calculated as the sum of the properties with a known, suspected and possible lead service line, plus distribution of additional filters to multiple units at the same property and less the number of vacant properties).

[4] "Possible lead" as defined in the Variance includes service lines where 0.5 ≤ p-value < 0.8. In the Base Inventory and Feb. 5, 2020 Submittal, service lines with p-value = 0.7 were included as "suspected lead." This was corrected in subsequent reports submitted to CDPHE, including the current inventory. For the Base Inventory numbers shown in Figure 3, this affected 431 service lines with a p-value = 0.7 included as "possible lead". This does not affect the calculation used for the total estimated number of lead services.

[5] The 2020 Annual Report, the July 9, 2021 submittal, and the current inventory counts for "known lead" include properties that are either known to be lead or that have had a lead service line replaced. 10,206 properties categorized as "known lead" in the current inventory were replaced since program inception (see Table 13 and Table 20). Due to ongoing data integration and QC processes, 160 of the 10,206 properties identified as confirmed replacements remain to be integrated into the LRP database to drive a p-value change to 0. Of these 160, three remain as "unlikely lead", 23 as "possible lead", 102 as "suspected lead", 10 as "known lead", and 22 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.

[6] The 2020 Annual Report, the July 9, 2021 submittal, and the current inventory counts for "non-lead" do not include the properties at which the LSL was replaced as part of the LRP (see Table 13 and Table 20), as these are already included in the count for "known lead".

[7] See Appendix INV-5 Summary of Service Line Status and p-Value (Second Six-Month Period of 2021) for details on how this was calculated.

A desktop review was performed this reporting period on all properties included in the LSL Inventory to focus on two scenarios: properties with replacements completed before the launch of the LRP in January 2020 and properties with both a parcel date and tap date after 1951. As a result of this review, the p-value for 273 properties was adjusted to 0 on the basis of Denver Water records confirming replacement before 2020. The p-value of an additional 87 properties

was adjusted to 0 on the basis that the parcel date and tap year were both after 1951 and at least one additional investigative method confirmed copper (i.e., visual observation and/or water quality).

Of the 152,267 service lines identified as non-lead in the current inventory (see Table 12), 105,857 are included in this category based solely on statistical assumptions such as the age of the house, history of development in the Denver Water service area, operating rules requiring copper at post-1971 properties, water main tap date, etc.[24] Properties built or connected between 1951 and 1971 are considered "unlikely lead" based on historical records and evidence of non-lead materials.[25]

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

The total number of lead services lines replaced between June 5 and Dec. 3, 2021, is shown in Table 13. Denver Water does not count the replacement of copper service lines (i.e., non-lead) toward the total number of lead service line replacements for compliance purposes.[26]

TABLE 13. NUMBER OF LSL REPLACEMENTS BETWEEN JUNE 5 AND DEC. 3, 2021

Description	Count[1]
Number of LSLs Replaced in June 2021 (June 5 to June 30)	403
Number of LSLs Replaced in July 2021	471
Number of LSLs Replaced in August 2021	493
Number of LSLs Replaced in September 2021	423
Number of LSLs Replaced in October 2021	402
Number of LSLs Replaced in November 2021	249
Number of LSLs Replaced in December 2021 (through Dec. 3)	19
Total Number of LSLs Replaced in the Second Six Months of 2021	2,460
Total Number of LSLs Replaced in 2021	4,692
Number of LSLs Replaced not Previously Reported in 2021[2]	115
Total Number of LSLs Replaced since inception of LRP on Jan. 1, 2020	10,206

[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 2021) do not match the number of lead service line replacements shown in Table 13 due to a lag in the quality assurance review during data integration from field replacements to LRP database.

[2] This includes the net change to the number of LSL replacements completed in the first six-month period of 2021 not previously reported (115 added) and previously reported LSL replacements that upon review were removed (no deductions); see Appendix LSL-9 Addresses and Types of Replacements for Properties Not Previously Counted and Duplicates (from First Six-Month Period of 2021) for details.

[24] 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).

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

[26] 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 2021).

Investigations of Service Line Material [7.B.ii.f]

Investigations are performed at properties to improve the assumptions that are used to develop the LSL Inventory. Investigations are counted by property and may include desktop evaluation of available data from Denver Water, assessors, permits, distributors, and customers; water quality sampling; potholing and/or visual investigation. After 15 years of the LRP, there should be no remaining properties in the LSL Inventory categorized as suspected or possible lead and all known LSLs should be replaced.

The number of properties which are investigated to support a determination of the service line material are counted toward the required 1.4% of the LSL Inventory investigated each year.

An investigation is counted if all the following conditions apply:

1) The property is originally classified as a suspected or possible lead service (see paragraphs 3.B and 3.D in the Variance).
2) The investigation was performed independently of LSL replacement and not as part of the 2021 ALSLR Plan[27] (see paragraph 3.D in the Variance).
3) The investigation was not the result of a customer requested water quality sample (see paragraph 1.J in the Variance).

A three-point investigative process is used to determine the status of a service line:

1) Pothole between the main to water meter and again between the water meter to the building.
2) Visual inspection inside the building where the service line enters.
3) Sample for water quality.

Potholing can be used in combination with other investigative methods to determine that a property is designated “unlikely lead” or “non-lead” (i.e., p-value of 0.02 or 0, respectively). To confirm “unlikely lead” or “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.

In some cases, additional investigative steps are necessary to confirm non-lead. A four-point or five-point investigative process is used when either the interior inspection is not possible and/or water quality testing is inconclusive (between 1 and 3 µg/L) or not available.

[27] The 2021 ALSLR Plan accounts for replacements completed by the ALSLR contractors and Denver Water’s T&D on planned watermain projects. Material verification efforts undertaken at properties included in the 2021 ALSLR Plan do not count toward the mandatory number of investigations of clause 3.D.

In the absence of an interior inspection where the service line enters, a four-point investigative process is used to determine the material of a service line and includes four visual confirmations of the material:

1) Two potholes from the main to water meter.
2) Two potholes from the water meter to the building.
3) Water quality sample result less than 1 µg/L.

In the absence of a water quality result, or when a water quality result is inconclusive, a five-point investigative process is used to determine the material of a service line and includes five visual confirmations of the material:

1) Two potholes from the main to water meter.
2) Two potholes from the water meter to the building.
3) Inspection at the interior connection.

Investigative potholing is used at properties to improve the knowledge of the inventory at properties that are not included in the 2021 ALSLR Plan. Verification potholing is used at properties included in the 2021 ALSLR Plan to confirm the material of the service line before replacement. As of Aug. 10, 2020, all properties with a p-value ≥ 0.5 are verified prior to replacement, with potholing and/or water quality sampling, to reduce the likelihood of replacing a non-lead service line.

Results from verification potholing are presented in Table 14 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 (i.e., COPP-COPP-COPP 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., water quality sampling, data review, additional potholing) to help identify the service line material.

TABLE 14. OUTCOMES FROM VERIFICATION POTHOLING[1] AS PART OF THE 2021 ALSLR PLAN (JUNE 5 TO DEC. 3, 2021)

Service Line Status before Potholing	Potholing Outcome	Update Inventory and Follow-up Action
Initial Status p ≥ 0.8 (total 1,755)	1,127 confirmed lead (lead observed in at least one point)	Property is confirmed for 2021 ALSLR Plan.
	215 inconclusive (copper observed at three or more points)	Review historical and water quality data to confirm status.
	413 incomplete (could not pothole the minimum three points)	Return to property or find a way to obtain third point. Or proceed with other investigation to confirm status.
Initial Status 0.5 ≤ p < 0.8 (total 289)	74 confirmed lead (lead observed in at least one point)	Property is confirmed for 2021 ALSLR Plan.
	83 inconclusive (copper observed at three or more points)	Review historical and water quality data to confirm status.
	132 incomplete (could not pothole the minimum three points)	Return to property or find a way to obtain third point. Or proceed with other investigation.
Total Number of Properties Potholed and Included in the 2021 ALSLR Program (Verification Potholing)		2,052[2]

[1] Potholing to verify the material of the service line at properties included in the 2021 ALSLR Plan does not contribute to the required 1.4% investigations. See Appendix INV-7 Results from Potholing for Verification as part of the 2021 ALSLR Program (Second Six-Month Period of 2021).

[2] Includes eight premises with initial p-values less than 0.5 in the Feb. 20, 2020 Inventory (from Table 12) that were subsequently increased to greater than or equal to 0.5 and therefore eligible for potholing as part of the ALSLR Plan. Two of the eight properties have p-values that remain above 0.5, two had their p-values changed to 0 due to potholing, and four had their p-values changed to 0 due to replacement as part of the ALSLR Plan (2,044 + 2 + 2 + 4 = 2,052.

During the second six months of 2021, investigative potholing was performed at 215 properties not included in the 2021 ALSLR Plan.[28] Denver Water investigated critical customer properties in advance of replacement: if lead is found, the property is scheduled for replacement in 2021 and therefore the investigation is considered a verification pothole and does not contribute to the required number of annual investigations. During the second six-month period of 2021, potholing was performed at six properties included in Table 15, three of which confirmed copper, and three of which confirmed lead. Only one of the six critical customers potholed counted toward the 1.4% investigations, as its initial p-value was ≥ 0.5.

[28] See Appendix INV-8 Results from Potholing for Investigations not part of the 2021 ALSLR Program (Second Six-Month Period of 2021).

TABLE 15. OUTCOMES FROM INVESTIGATIVE[1] POTHOLING INDEPENDENT OF THE 2021 ALSLR PLAN FROM JUNE 5 TO DEC. 3, 2021

Service Line Status before Potholing	Potholing Outcome[2]	Update Inventory and Follow-up Action
Initial Status 0.5 ≤ p <0.8 (total 210)	27 confirmed lead or galvanized (lead/galvanized observed at least one point).	Add property to list for LSL replacement.
	142 confirmed copper (copper observed at all points).	Remove property from LRP.
	41 incomplete (could not complete observation at all points).	Return to property to obtain all observation points. Or proceed with other investigation.
Initial Status p < 0.5[3] (total 5)	2 confirmed lead or galvanized (lead/galvanized observed at least one point).	Add property to list for LSL replacement.
	0 confirmed copper (copper observed at all points).	Remove property from LRP.
	3 incomplete (could not complete observation at all points).	Return to property to obtain all observation points. Or proceed with other investigation.
Total Number of Properties Potholed Independent of the 2021 ALSLR Program (Investigative Potholing, Second Six Months Only)		215

[1] Potholing to investigate the material of the service line at properties not included in the 2021 ALSLR Plan contributes to the count of the required 1.4 percent investigations.
[2] The number of potholes completed as shown in Appendix INV-6B Line by Line p-Value Changes by Status does not match data shown in this table due to a time lag between field activities and the data being collected, reviewed, confirmed, and added to the LRP database.
[3] This includes critical customers that were originally assigned a p-value < 0.5. Upon subsequent review of information provided, further investigation was required. These five properties do not count toward the 1.4% investigations required because the initial p-value is less than 0.5. One critical customer with an initial p-value of ≥ 0.5 did count toward the 1.4% investigations required.

Results for water quality sampling at properties included in the 2020 or 2021 ALSLR Plans are presented in Table 16 (i.e., verification pre-LSL replacement sampling) and results from properties not included in the 2020 or 2021 ALSLR Plans are presented in Table 17 (i.e., investigative sampling). As of Feb. 25, 2021, results from water quality sampling were 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 above 8.5.[29] This means that any sample collected on or after May 1, 2020, with lead measured above 3 µg/L in the second or third bottle of the 3-bottle test are considered conclusive for a lead service line. Lead measured below this threshold at properties with an initial status of possible or suspected lead (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 < 0.5) is considered conclusive for non-lead and no additional investigations

[29] See monthly reports and Appendix REG-2 Copies of Letters for Compliance-Related Submissions (Second Six-Month Period of 2021).

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 when and only when copper is observed at three or more points. In summary, whereas water quality sampling above 3 µg/L is conclusive for lead, additional steps are taken to confirm non lead and the p-value is not reduced to 0 based on water quality results alone.

TABLE 16. OUTCOMES FROM WATER QUALITY INVESTIGATIONS[1] AS PART OF THE 2021 ALSLR PLAN (JUNE 5 TO DEC. 3, 2021)

Service Line Status in Baseline Inventory	Water Quality Sampling Outcome	Update Inventory and Follow-up Action during First Six-Month Period of 2021
Initial Status 0.5 ≤ p ≤ 0.9 (total 140)	22 confirmed lead (lead measured > 3 µg/L in the second or third sample bottle from the 3-bottle test)	Add property to list for LSL replacement.
	118 inconclusive (lead measured ≤ 3 µg/L in the second or third sample bottle from the 3-bottle test)	Review historical and potholing data to confirm status. Or proceed with other investigation.

[1] Excludes customer requested sample results. These samples were collected at properties included in the 2021 ALSLR Plan (and therefore do not count toward the required 1.4% investigations.

TABLE 17. OUTCOMES FROM WATER QUALITY INVESTIGATIONS[1] INDEPENDENT OF THE 2021 ALSLR PLAN (JUNE 5 TO DEC. 3, 2021)

Service Line Status in Baseline Inventory	Water Quality Sampling Outcome	Update Inventory and Follow-up Action during First Six-Month Period of 2021
Initial Status 0.5 ≤ p <0.9 (total 2,436)	415 confirmed lead (lead measured > 3 µg/L in the second or third sample bottle from the 3-bottle test)	Add property to list for LSL replacement.
	2,021 inconclusive (lead measured ≤ 3 µg/L in the second or third sample bottle from the 3-bottle test)	Review historical and potholing data to confirm status. Or proceed with other investigation.

[1] Excludes customer requested sample results. These samples were collected at properties independent of the 2021 ALSLR Plan and therefore do count toward the required 1.4% investigations, if the conditions that define an investigation are met.

All other changes to the status of a service line that count toward the 1.4% required investigations were made using desktop methods, as shown in Table 18. In summary, desktop investigations were used to change the material designation from either a suspected or possible lead service line to non-lead at 292 properties during the second six-month period of 2021.[30]

[30] See Appendix INV-6B Line by Line p-Value Changes by Status (Second Six-Month Period of 2021).

TABLE 18. NUMBER OF INVESTIGATIONS PERFORMED TO DETERMINE THE MATERIAL OF THE SERVICE LINE BETWEEN JUNE 5 AND DEC. 3, 2021

Number of Properties Investigated	Count
Required Number of Investigations	1,168 (1.4% of all suspected and possible lead services from the September 2019 inventory)
Number of Investigative Potholing in the Second Six Months of 2021 as reported in the LRP database (from Table 15)[1]	162
Number of Investigative Water Quality Sampling in the Second Six Months of 2021 as reported in the LRP database (from Table 17)[2]	2,369
Number of Desktop Investigations in the Second Six Months of 2021	292
Total Number of Investigations Completed in the Second Six Months of 2021	2,823
Number of Investigations Not Previously Reported[3]	1,001
Number of Investigations Deducted from S1 2021 Report[4]	240
Total Number of Investigations Completed in 2021	3,840

[1] Of the 215 properties from Table 15, 53 do not count toward the required 1.4% investigations due to subsequent replacement or ineligibility attributable to the designation in the baseline inventory (p-value less than 0.5). See Appendix INV-8 Results from Potholing for Investigations not part of the 2021 ALSLR Plan (Second Six-Month Period of 2021) for more details.

[2] Of the 2,436 properties from Table 17, 67 do not count toward the required 1.4% investigations due to subsequent replacement or ineligibility attributable to the designation in the baseline inventory (p-value less than 0.5).

[3] Based on correspondence with EPA describing the counting of investigations, 1,017 investigations were performed during the first six-month period of 2021 although only 16 were previously reported (1,017 - 16 = 1,001 investigations not previously reported). See letter dated Nov. 17, 2021 in Appendix REG-2 Copies of Letters for Compliance-Related Submissions (Second Six-Month Period of 2021).

[4] These investigations relied on customer requested samples and thus are ineligible as an investigative method.

Updated LSL Inventory Map [7.B.ii.g]

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

On Sept. 29, 2021, the publicly available map was updated and reposted, incorporated the Sept. 24, 2021, 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 by the end of December.

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

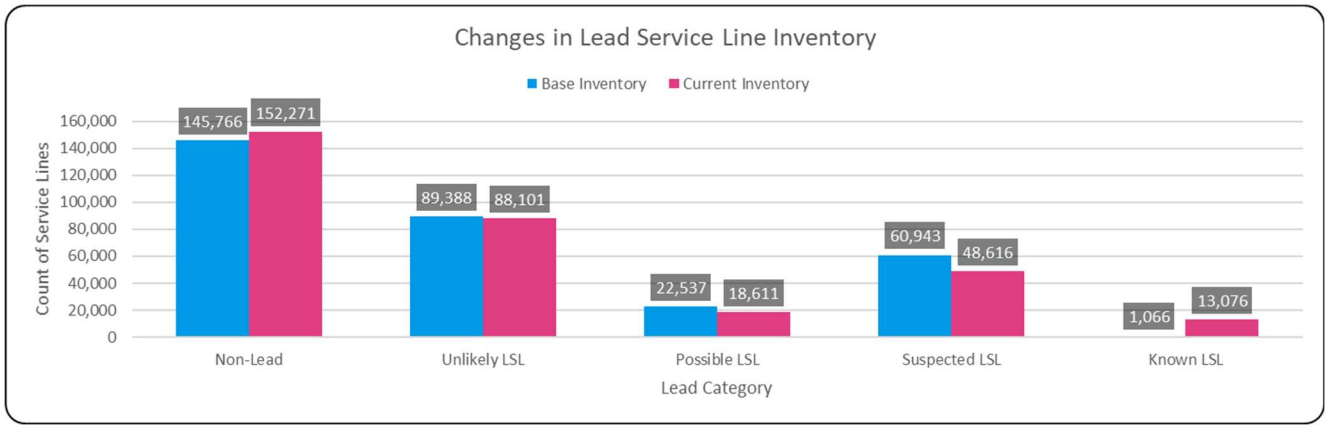
Between June 5 and Dec. 3, 2021, updates to the LSL Inventory continued as additional data were gathered and reviewed. During this period, 4,414 changes were made to the LSL Inventory of which 4,407 were changes to the status of the service line (i.e., p-value).[32] This included changes based on confirmation from Denver Water, customers and distributors; review

[31] See Appendix INV-5 Summary of Service Line Status and p-Value (Second Six-Month Period of 2021).

[32] See Appendix INV-6B Line by Line p-Value Changes by Status (Second Six-Month Period of 2021).

of historical data; direct evidence such as water quality and/or potholing; and replacements. In addition to material status changes, 7 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 21 properties in this reporting period.[33] These changes are shown in Figure 3 and are accounted for in Table 12.

FIGURE 3. CHANGES IN THE BASE[1] AND CURRENT INVENTORY (JUNE 5 AND DEC. 3, 2021, USING DATA FROM COLUMNS 2 AND 5 FROM TABLE 12)



[1] "Possible lead" as defined in the Order includes service lines with 0.5 ≤ p-value < 0.8. In the Base Inventory, Feb. 5, 2020 Submittal of Table 13, service lines with p-value = 0.7 were included as "suspected lead." For the Base Inventory shown here, 431 service lines at p-value = 0.7 are included under "possible lead". "Known lead" includes properties that are either known to be lead or that have had a lead service line replaced.

[33] See Appendix INV-6B Line by Line p-Value Changes by Status (Second Six-Month Period of 2021).

7.B.iii LSL Replacements

Section 7.B.iii of the Variance requires that Denver Water report and maintain records of lead service lines 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 (full, partial including galvanized, by third party);*
>
> *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 due to an emergency repair and property owner consent could not be obtained.*
>
> *Text is taken verbatim from the Order, dated Dec. 16, 2019.*

Replacements under the ALSLR Program started on March 5, 2020, and results from June 5 through Dec. 3, 2021, are described in this section. An overview of the LSL replacement requirements is shown in Table 19.

TABLE 19. OVERVIEW OF 7.B.III REQUIREMENTS

Paragraph Reference	Description	Refer to
4.A	Implement accelerated LSL replacement within 90 days of the effective date.	Contractors were given Notice to Proceed on March 5, 2020.
4.E	Offer post-LSL replacement sampling within six months.	Ongoing.
7.B.iii.a	Address and date of all replacements.	See Appendix.[34]
7.B.iii.b	Type of replacement.	See Table 20 and Appendix.[34]
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.[35]
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.[1]
7.B.iii.d	Number of properties where an emergency repair was performed using a partial LSL replacement and consent was not granted by the property owner to replace a lead service line in full.	See Table 20 and Appendix.[36]

[34] See Appendix LSL-6 Addresses and Types of Replacement (Second Six-Month Period of 2021).
[35] See Appendix LSL-7 LSL Replacement Refusal List (Second Six-Month Period of 2021).
[36] See Appendix LSL-8 Properties with an Emergency Service Line Repair Resulting in a Partial Replacement (Cumulative since LRP Inception).

Paragraph Reference	Description	Refer to
LRPP III.D (p 57)	Replace LSL at properties with consistently high lead release and critical care 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 18.
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.[37]

[1] Note that two multi-family properties signed a letter in August 2020 declining enrollment in the LRP that were not previously reported.

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

Denver Water T&D crews and ALSLR contractors started LSL replacements in the second program year on Jan. 1, 2021. The ALSLR contractors focused primarily on geographic task order work areas. A total of 12 geographic task orders each with approximately 400 properties were developed and issued to three ALSLR contractors. A list of addresses and dates for each replacement can be found in the appendices.[38]

Denver Water T&D completed LSL replacements as part of water main replacement work and emergency repairs as well as assisting with individual and geographic area LSL replacements. Denver Water T&D crews continue to target critical customers at schools, daycare centers, and childcare facilities within City and County of Denver to confirm the status of the service line and replace lead where found. The 2020 ALSLR Plan properties that required additional follow-up to make three reasonable attempts at contact were included in the 2021 ALSLR Plan. Additionally, any daycare or childcare facility added to CDPHE's licensed childcare facility dataset since 2020 was added to the 2021 ALSLR Plan. The critical customer list included 146 properties at the start of the year, mostly rollover properties from the 2020 ALSLR Plan with a small number of newly identified critical customers for the 2021 ALSLR Plan. Since the start of the year, 36 properties were removed from the list upon confirmation of a non-lead service line and the lead service line was replaced at another 28 properties. At the end of this reporting period, 82 properties remain on the critical customer list. For the remaining properties, all contact attempts have been made with no response. 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 T&D crews perform individual replacements within approximately two weeks at properties where lead is measured above 150

[37] See Second Quarter Report of 2020.
[38] See Appendix LSL-6 Addresses and Types of Replacement (Second Six-Month Period of 2021).

µg/L and within approximately two months at properties where lead is measured above 25 µg/L if the property is not already scheduled for replacement as part of the 2021 ALSLR Plan.

Protocols to manage the health and safety concerns of COVID-19 are reinforced with mask use by field crews and customers along with physical distancing protocols to allow work to continue. To date, customers have complied, and protocols are being followed with limited disruption to the progress of the ALSLR Program.

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

The types of replacements completed between June 5 and Dec. 3, 2021, are summarized in Table 20. Denver Water maintains a detailed list of the type of LSL replacements completed and the associated addresses.[39]

TABLE 20. TYPE OF LSL REPLACEMENTS (JUNE 5 TO DEC. 3[1], 2021)

Type of LSL Replacement June 5 to Dec. 3, 2021	Denver Water (Watermain, Emergency, and ALSLR)[2]	Third Party (Developer, Homeowner, and Other)[3]	Total
Full Lead Replacement[4]	1,111	144	1,255
Partial Lead Replacement, such that no Lead Remains After Replacement[5]	933	1	934
Full Galvanized Replacement	6	0	6
Partial Galvanized, such that no Lead or Galvanized Remains After Replacement	265	0	265
TOTAL REPLACEMENTS in Reporting Period, with no Lead Remaining After Replacement	**2,315**	**145**	**2,460**
TOTAL REPLACEMENTS Not Previously Reported[6]	32	83	115
TOTAL REPLACEMENTS completed since LRP Inception	**9,537**	**741**	**10,206**
Emergency Repair, Partial Replacement (i.e., where consent was NOT granted and lead remains in the ground)	17	0	17

[1] Properties that had a replacement on or before Dec. 3, 2021 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 Second Annual Report.
[2] Includes LSL replacements completed as part of water main projects, emergency repairs, scheduled replacements, 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 2021)).
[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 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 2021)).
[6] This includes replacements completed in the first six-month period of 2021 but not previously reported (115 added); see Appendix LSL-9 (Addresses and Types of Replacements for Properties Not Previously Counted and Duplicates (from First Six-Month Period of 2021)).

[39] See Appendix LSL-6 Addresses and Types of Replacement (Second Six-Month Period of 2021).

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

Distribution of notification letters, including consent forms, was initiated on Dec. 4, 2020, to property owners included in the 2021 ALSLR Plan. Since then, notifications were mailed to all properties identified in the geographic work areas of the 2021 ALSLR Plan, after which multiple contacts are made to obtain signed consent forms.[40] Reconnaissance or pre-construction meetings are conducted with each property owner to plan the LSL replacement work and schedule the replacement.

A summary of the number of property owners contacted and number of signed consent forms returned is presented in Table 21. Between June 5 and Dec. 3, 2021, a total of 145 property owners refused to participate in the ALSLR Program or were non-responsive following multiple attempts at contact. At least three attempts to obtain voluntary consent from a property owner are undertaken before work can start to replace the lead service line.

TABLE 21. SUMMARY OF CONSENT AND LSL REFUSAL LIST (JUNE 5 TO DEC. 3, 2021)

Description	Consent Form Signed[1]	Customer Refused[2]
Total Number of Properties for which Consent was Given or Refused during the Second Six Months of 2021	705	132
Total Number of Properties for which Consent was Given or Refused Year-to-Date	2,842	282[3]

[1] The total number of signed consent forms represent only the ALSLR contractors. Detailed consent collection activity is not comprehensively tracked for replacements other than ALSLR contractors. A revised procedure to track this information for all replacements is under development for implementation in 2022.

[2] The total number of refusals year-to-date includes attempts made by the ALSLR contractors at properties with descriptions of "consent not granted due to refusal" and "non-responsive" after at least three attempts were made. When a customer refuses or is non-responsive, the service point ID is provided to the COE team for follow-up. See explanations in Appendix LSL-7 LSL Replacement Refusal List (Second Six-Month Period of 2021).

[3] The year-to-date refusal number from the first six-month period of 2021 plus the number of refusals in the second six-month period of 2021 do not equal the year-to-date number shown here. This is a rolling list and customers who originally refused and subsequently granted consent are removed from the Refusal List. See Appendix LSL-7 LSL Replacement Refusal List (Second Six-Month Period of 2021).

A range of outreach methods is used to contact property owners.[41] At least two attempts at contact by mail plus one attempt at contact in person is made before a property is considered non-responsive. 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, as well as 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.

[40] See Appendix LSL-7 LSL Replacement Refusal List (Second Six-Month Period of 2021).
[41] See Appendix COE-H.1 2021 COE Plan included with the Fourth Quarter Report of 2020.

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.[42] An outreach approach was identified for customers with properties on the 2020 and 2021 Refusal List who have not had ownership change and been contacted through the ownership change follow-up process. This outreach will be conducted in early 2022 with the goal of gaining consent for service line replacement despite previous contact attempts and refusal. Additionally, any change to the property ownership triggers additional outreach to obtain consent to replace the LSL. Three changes in ownership occurred at properties on the Refusal List between June 5 and Dec. 3. Follow up is underway to gain consent for replacement from the new owner within 91 days of the change of ownership.[43]

A property is described as "non-responsive" while the task order for the affected work order remains open (i.e., there is ongoing construction activity). A property is added to the Refusal List as task orders for a work area are closed out (i.e., the construction crew demobilizes).[42] This process is part of administrative close out of the task order. As a result of the task orders closed out at the start of 2021, the number of refusals has noticeably increased for this reporting period. This is countered by the increasing number of property owners granting access to contractors to facilitate the replacement as pandemic-related concerns appear to decline.

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 time frame, the property is treated as not responsive and is added to the list of "non-response" until the issue is resolved and the lead service line can be replaced.[44]

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

During this reporting period, 17 partial replacements occurred as a result of emergency repair, watermain replacement, or third-party contractor work (i.e., some lead may remain in the ground). This affected a total of 46 properties since program inception in January 2020 as a result of:[45]

- 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 6 properties).

[42] See Appendix LSL-7 LSL Replacement Refusal List (Second Six Months of 2021).
[43] See Appendix LSL-10 Ownership Changes for Properties on the Refusal List.
[44] See Appendix COE-D.12 Safety or Repairs Needed Notification Letter of Second Quarter Report (2020).
[45] See Appendix LSL-8 Properties with an Emergency Service Line Repair Resulting in a Partial Replacement (Cumulative since LRP Inception).

- The property owner declined replacement at the time of the work (this affected 9 properties).
- No consent to perform the full replacement due to no response from the property owner (this affected 19 properties, 6 of which were not previously reported in first six-month period of 2021).
- Restricted access due to the interior plumbing arrangement (6 properties).
- Property redevelopment (2 properties).
- To be rescheduled because property owner was not comfortable with replacement during COVID-19 (3 properties).
- Restricted access due to gas station logistical constraints (1 property).

Attempts to obtain consent to complete the replacement in full were made and outreach with the property owner continues in order 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. addresses of Customer Premises where filters and replacement cartridges have been provided, and certification of the number of homeowners with known, suspected, or possible LSLs that are not part of filter program because they use their own filter or bottled water;*
>
> *b. the total number of filters and replacement cartridges distributed per Program Year;*
>
> *c. the percent filter adoption for each year of the variance, 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 and maintenance under paragraph 5.F; and*
>
> *h. Denver Water shall notify CDPHE and EPA within 10 Days of receiving sample results if data indicate measurable lead in filtered drinking water and shall provide the measured levels of lead in filtered water.*
>
> *Text is taken verbatim from the Order, dated Dec. 16, 2019.*

The Filter Program targets properties with known, suspected, and possible LSLs (i.e., with p-values 0.5 and higher). The Filter Program includes the distribution of pitcher filters, on-going outreach and education to encourage pitcher filter use and the distribution of filter cartridge replacements. Using the current LSL Inventory from Table 12, it is estimated that Filter Program participants consist of approximately 93,859 Denver Water household units.

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 22.

TABLE 22. OVERVIEW OF 7.B.IV REQUIREMENTS

Paragraph Reference	Description	Refer to
7.B.iv.a	Address of all customers enrolled in the Filter Program and provided with filters and cartridges. Certification of number of customers with a known, suspected or possible LSL that use their own filter or bottled water.	See Appendix.[46]
7.B.iv.b	Total number of filters and cartridges distributed per year.	See Annual Report.
7.B.iv.c	Percent filter adoption rate per year. Description of method to determine the filter adoption rate.	See Annual Report.
7.B.iv.d	Maintain list of addresses and Service Point Identification that use a filter or bottled water and any changes to the list.	See Appendix.[47]
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.[48]
7.B.iv.f **7.B.iv.g** **5.F.ii**	Confirmation of filter performance in the field (50+ locations included in the LCR compliance sampling). Collect samples using a protocol approved by EPA and CDPHE. Collect additional information regarding the use and operation of the filter.	See Appendix[49] for sample results from March 17 and May 25, 2021. Protocol for filter sample collection approved July 17, 2020, by EPA. Included in this section.
7.B.iv.h	Notify CDPHE and EPA within 10 days of receiving sample results indicating measurable lead in filtered samples.	See Appendix.[49]
5.A	Begin distribution of education materials, filters and replacement cartridges within 90 days of the effective date. Complete distribution of first six monthly supply within 270 days of the effective date.	Distribution completed Sept. 21, 2020, as described in Third Quarter Report of 2020.
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. See Appendix. [50]
5.C	Provide education materials within two weeks of a change in customer account. Provide filters and replacement cartridges within 35 days of a change in customer account.	See Appendix.[51] See Appendix.[52]

[46] See Appendix FIL-13 Filter Delivery Addresses (Second Six-Month Period of 2021).
[47] See Appendix FIL-14 Filter Program Opt-Outs (Second Six-Month Period of 2021).
[48] See Appendix FIL-15 Filter Program Refusals (Second Six-Month Period of 2021).
[49] See Appendix FIL-16 Confirmation of Filter Performance in Field Results (Second Six-Month Period of 2021).
[50] See Appendix FIL-17 Replacement Cartridge Distribution Addresses (Second Six-Month Period of 2021).
[51] See Appendix FIL-18 Occupancy Changes - COE Distribution (Second Six-Month Period of 2021).
[52] See Appendix FIL-19 Occupancy Changes - Pitcher Filter Distribution (Second Six-Month Period of 2021).

Paragraph Reference	Description	Refer to
5.D	Offer filters to 1983 to 1987 households with formula-fed infants and children under 2 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 2020 COE Plan and 2021 COE Plan.
5.E.i	Survey enough customers enrolled in the Filter Program to receive 1,059 responses. Seek approval from CDPHE and EPA for the filter adoption survey questions prior to distribution.	See annual report. Approved on Sept. 10, 2020.[53]
5.F.i	Confirmation of filter performance before distribution within 90 days of the effective date.	Submitted Feb. 13, 2020. Approved April 1, 2020. See First Quarter Report of 2020.
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 Appendix.[54]
LRPP Executive Summary (p 9) and III.C (p 56)	If the localized filter adoption rate is less than 75%, 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.[55]

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

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 23 for pitcher filter distribution.

[53] See Third Quarter Report of 2020 (Appendix FIL-29 OMB Approved Filter Adoption Survey Questions).
[54] See Appendix FIL-20 Proof of Outreach to 95% of Customers in Filter Program.
[55] See Appendix FIL-21 Informal Filter Adoption Survey Results Summary (Second Six-Month Period of 2021).

TABLE 23. SUMMARY OF FILTER DISTRIBUTION (JUNE 5 TO DEC. 3, 2021)

Description	Count	Comment
Initial Pitcher Distribution for Customers Enrolled in 2021	29	See Appendix.[56]
Total Number of Households Provided with a Filter Kit between June 5 and Dec. 3, 2021	2,810	See Appendix.[57]
Number of Households that Use their own NSF-Certified Filter or Bottled Water between June 5 and Dec. 3, 2021	1	See Appendix.[58]
Number of Households that Declined to Use a Filter or Bottled Water between June 5 and Dec. 3, 2021	35	See Appendix.[59]

New customers enrolled in the Filter Program in 2021 are included in the count for initial distribution of pitcher filters in Table 23, along with customers that were previously enrolled in the Filter Program but that failed to receive their initial pitcher filter. Together, this represents approximately 3% of the current 93,859 customers enrolled in the Filter Program. In general, the customers did not receive a pitcher filter as a result due to either missing or erroneous address information:

1) Unit number at residential properties with a general address to allow customers to receive filters.
2) Unit number at multi-unit commercial properties with a general address to allow customers to receive filters. Some of these were identified from customers calling in to alert Denver Water of additional units or through review of unit numbers for completeness.

Addresses where filters could not be delivered were investigated for accuracy and a filter kit and program introduction booklet was sent once the address could be confirmed. Corrective actions have been implemented to reconcile all known addresses, identify incorrect addresses, and distribute pitcher filters as required.[60] As part of this exercise, 1,360 properties were reviewed during the second six-month period of 2021.

An analysis of return-to-sender addresses was performed in 2020 and described in the Third Quarterly Report for 2020; this exercise was not repeated in 2021. However, throughout 2021, return-to-sender addresses continued to be investigated and upon reconciliation a filter kit is re-sent to the correct address or if vacant, the property is removed from the LRP.

[56] See Appendix FIL-22 Initial Pitcher Filter Distribution After 2020 (Second Six-Month Period of 2021).
[57] See Appendix FIL-13 Filter Delivery Addresses (Second Six-Month Period of 2021).
[58] See Appendix FIL-14 Filter Program Opt-Outs (Second Six-Month Period of 2021).
[59] See Appendix FIL-15 Filter Program Refusals (Second Six-Month Period of 2021).
[60] See Appendix FIL-22 Initial Pitcher Filter Distribution After 2020 (Second Six-Month Period of 2021).

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

Between June 5 and Dec. 3, 2021, replacement filters were distributed to an additional 5,410[61] customers enrolled in the Filter Program.

During this same period, 95,655 replacement filter cartridges were distributed to customers enrolled in Filter Program in accordance with the manufacturer's recommendation for replacement within six months.[62] Replacement filters mailed to 272 properties were returned-to-sender.[63] 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. 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.[64]

A summary of distribution of post-LSL replacement filters is provided in Table 24.

TABLE 24. SUMMARY OF SIX-MONTH SUPPLY POST-LSL REPLACEMENT FILTER DISTRIBUTION (JUNE 5 TO DEC. 3, 2021)

Description	Count	Comment
Number of Households Provided with Six-Month Supply of Filter Replacements Post Lead Service Line Replacement between June 5 and Dec. 3, 2021[1,2]	2,532	This includes emergency repairs and replacements performed by Denver Water and third parties. See Appendix.[65]

[1] This value may not match the number of lead service line replacements completed between June 5, 2021, and Dec. 3, 2021: 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 lead service line replacement was completed by a third party, as identified in Table 20.

Occupancy Changes [5.C]

Denver Water was notified of 2,810 occupancy changes between June 5 and Dec. 3, 2021.[66] Occupancy changes are tracked daily to provide multiple mailings per week to allow new

[61] 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 9,934.
[62] See Appendix FIL-17 Replacement Cartridge Distribution Addresses (Second Six-Month Period of 2021). These are the number of properties without duplicates (sometimes the property will receive more than one). The number of replacement filter cartridges with duplicates is 96,520.
[63] See Appendix FIL-24 Filter Program Replacement Cartridge Returns (Second Six-Month Period of 2021).
[64] See Appendix REG-2 Copies of Letters for Compliance-Related Submissions (Second Six-Month Period of 2021) and the First Semi-Annual Report of 2021.
[65] See Appendix FIL-23 Distribution of Post Lead Service Line Replacement Six-Month Cartridge Replacement Supply (Second Six-Month Period of 2021).
[66] See Appendix FIL-19 Occupancy Changes – Pitcher Filter Distribution (Second Six-Month Period of 2021).

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 filter were distributed within 14 and 35 days respectively, at all properties where a change in occupancy occurred.[67]

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

As described in Table 9, no 1983 to 1987 households with formula-fed infants requested enrollment in the Filter Program during the second six-month reporting period of 2021, i.e., a select household as identified in paragraph 5.D of the Variance.[68]

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

The formal Filter Adoption Survey was approved by EPA on Sept. 10, 2020. The survey for 2021 was distributed on Aug. 2, 2021, to 15,000 properties or about 16% of customers enrolled in the Filter Program.[69] The Filter Adoption Survey participants submitted survey responses online or mailed in hard copy responses. Survey respondents had to answer questions one through three (regarding filter adoption for filter water used for drinking, cooking, and infant formula) to be included in the analysis and calculation of the overall percent adoption. A total of 2,116 survey responses were received between Aug. 11 and Nov. 23 (Table 25). The overall adoption rate is incorporated into the equivalency model presented in the annual report.

TABLE 25. SUMMARY OF FORMAL FILTER ADOPTION SURVEY RESULTS

Question	Count		Percent	
	Yes	No	Yes	No
Filtered or bottled water used for drinking water	1,994	122	94%	6%
Filtered or bottled water used for cooking or participant does not cook	1,497	619	71%	29%
Survey participant has an infant in household or is expecting and uses filtered water or bottled water for infant formula preparation	38	3	93%	7%

Informal Filter Adoption Survey [7.B.vi.c]

Informal surveys of filter use are conducted during ALSLR pre-construction meetings and during the virtual meetings asking customers about filter adoption and use. Responses from 1,380 participants were captured in the LRP database from the pre-construction

[67] See Appendix FIL-19 Occupancy Changes - Pitcher Filter Distribution (Second Six-Month Period of 2021)
[68] See Appendix CCT-8 Summary of Water Quality Sampling Results from Select Households (1983 to 1987 Homes, Cumulative since LRP Inception).
[69] FIL-25 Formal Filter Adoption Survey Detailed Responses.

meetings.[70,71] This accounts for 30% of all customers who are expected to have their LSLs replaced in 2021 and suggests that most customers are using filtered or bottled water for drinking, cooking and infant formula:

- Of the 1,380 responses, the majority of customers indicated that they used filtered or bottled water for drinking (82%) and cooking (78%).
- All households with a formula-fed infant indicated that they used filtered water when preparing formula.

Informal surveys of overall filter use and barriers to using filtered water for cooking were conducted as part of the June and July 2021 virtual community meetings. An estimated 4,810 customers participated in one of these meetings, including a mix of customers enrolled and not enrolled in the LRP. Results indicated that 43% of meeting participants were using filtered water for all drinking and cooking needs, 22% for some drinking and cooking, 20% for drinking only, and 15% were not using filtered water. Responses were not analyzed to confirm participants were enrolled in the LRP and it is likely some participants were not enrolled, based on analysis from past virtual community meetings. These results are similar to past virtual meeting filter survey results in indicating a lower use of filtered water for cooking compared with drinking. Overall percentages for all answers are likely lower than in other surveys due to question wording and the inclusion of non-LRP enrollees in the virtual meeting. The majority of respondents (52%) indicated the greatest barrier to using filtered water for cooking was not having enough filtered water on hand, with the next most common barrier (25%) being that using filtered water for cooking was hard to remember and not part of customers' normal routines.[72]

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

The number of properties that choose 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 111 customers that have opted out since the launch of the Filter Program, 14 use bottled water as an alternative to the filter and 15 use their own filter certified NSF 53 for lead removal. For the 82 remaining customers, Denver Water was unable to confirm if the customer was using an NSF 53 certified filter.[73] Contact with customers continues to be attempted as part of an annual reminder to customers that have opted out or refused to participate in the Filter Program.[74]

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[70] See Appendix FIL-21 Informal Filter Adoption Survey Results Summary (Second Six-Month Period of 2021).
[71] See Appendix FIL-26 Informal Filter Adoption Survey Detailed Responses (Second Six-Month Period of 2021).
[72] See Appendix FIL-21 Informal Filter Adoption Survey Detailed Responses (Second Six-Month Period of 2021).
[73] See Appendix FIL-14 Filter Program Opt-Outs (Second Six-Month Period of 2021).
[74] The use of a NSF 53 certified filter could not be confirmed at some properties based on call center records. This affected 20 customers that indicated that they use their own filter; these properties were moved from the Opt-Out List to the Refusal List.

TABLE 26. 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)	63	9	6	48
2021 (Jan. 1 to June 4, 2021)	41	5	4	32
2021 (June 5 to Dec. 3, 2021)	1	0	1	0
Total Removed from LRP due to Non-Lead Designation or LSL Replacement	0	0	0	0
Total Since LRP Inception	131	15	13	98

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

From June 5 to Dec. 3, 2021, notice of refusal to participate in the Filter Program was received for 35 properties.[75] The reasons given for refusal include the pitcher is too heavy to use or 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 94 since the inception of the LRP.

TABLE 27. SUMMARY OF FILTER REFUSAL LIST

Reporting Period	Number of Properties Refusing to Participate
2020 (Jan. 1 to Dec. 31, 2020)	30
2021 (Jan. 1 to June 4, 2021)	29
2021 (June 5 to Dec. 3, 2021)	35
Total Removed from LRP due to Non-Lead Designation or LSL Replacement	0
Total Since LRP Inception	94

[75] See Appendix FIL-15 Filter Program Refusals (Second Six-Month Period of 2021).

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 for all households where filter kits were provided.[76]
- List of six-month supply of replacement filters provided after LSL replacement.[77]
- List of premise addresses and service point identification numbers for all households that refuse to participate in the Filter Program.[78]
- List of premise addresses that have returned replacement cartridges to sender.[79]
- 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.[80]
- Detailed responses from the informal filter use field survey responses collected as part of lead service line replacement activities.[81]
- Confirmation of pitcher filter performance in the field.[82]
- List of premise addresses and service point identification numbers for all households that opt-out of the Filter Program.[83]
- Replacement filter distribution.[84]
- Occupancy changes for pitcher filter distribution.[85]
- Occupancy changes for filter education information.[86]
- Initial Filter Distribution after 2020.[87]

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[76] See Appendix FIL-13 Filter Delivery Addresses (Second Six-Month Period of 2021).
[77] See Appendix FIL-23 Distribution of Post Lead Service Line Replacement Six-Month Cartridge Replacement Supply (Second Six-Month Period of 2021).
[78] See Appendix FIL-15 Filter Program Refusals (Second Six-Month Period of 2021).
[79] See Appendix FIL-24 Filter Program Replacement Cartridge Returns (Second Six-Month Period of 2021).
[80] See Appendix FIL-21 Informal Filter Adoption Survey Results Summary (Second Six-Month Period of 2021).
[81] See Appendix FIL-27 Informal Filter Adoption Survey Detailed Responses (Second Six-Month Period of 2021).
[82] See Appendix FIL-16 Confirmation of Filter Performance in Field Results (Second Six-Month Period of 2021).
[83] See Appendix FIL-14 Filter Program Opt-Outs (Second Six-Month Period of 2021).
[84] See Appendix FIL-17 Replacement Cartridge Distribution Addresses (Second Six-Month Period of 2021).
[85] See Appendix FIL-19 Occupancy Changes - Pitcher Filter Distribution (Second Six-Month Period of 2021).
[86] See Appendix FIL-18 Occupancy Changes - COE Distribution (Second Six-Month Period of 2021).
[87] See Appendix FIL-22 Initial Pitcher Filter Distribution After 2020 (Second Six-Month Period of 2021).

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

Field sampling is conducted by Denver Water in conjunction with LCR compliance sampling (see section 7.B.i). All samples collected to meet this requirement for the second six-month compliance period of 2021 are included in this reporting period. Samples were collected from 60 properties between Sept. 14 and Nov. 4, 2021. 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.

There continue to be some customers who are identified for inclusion in the filter performance testing in the field that do not use their filter and when this occurs, a sample is not collected from the filter.

Lead was measured in the unfiltered tap water at less than 2 µg/L in 30 samples collected on the same day the filter effluent sample was collected. Lead was measured below the detection limit in filtered water at 51 of the 60 properties and below 2 µg/L at all properties with one exception.[88] 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). The property with lead measured above 10 µg/L in filter effluent was immediately provided with a new filter pitcher and cartridge and the customer noted that the filter pitcher was not routinely used at the property. Results from testing the filter in the Denver Water lab confirmed that the filter effectively removed lead to less than 2 µg/L even when challenged with influent lead concentrations above 50 µg/L. The cause for the high release of lead from the filter could not be determined.

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 tap water sample.[89]

Information About Filter Usage and Maintenance Collected during Filter Performance Testing [7.B.iv.g, 7.B.vi.c]

Observations of filter use during filter performance testing in the field are reported with sampling results. Four customers indicated that they did not use the filter provided by Denver Water, three use a fridge filter, one uses tap water, and one did not provide an explanation.[90]

[88] See Appendix FIL-16 Confirmation of Filter Performance in Field Results (Second Six-Month Period of 2021).
[89] When lead is measured above 15 µg/L in the first draw sample, the property is scheduled for LSL replacement within two months.
[90] See Appendix FIL-16 Confirmation of Filter Performance in Field Results (Second Six-Month Period of 2021).

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

In 2021, proof of contact with customers enrolled in LRP is measured based on the mailing of a filter reminder postcard mailed on July 19, 2021. An analysis of return-to-sender addresses was performed in 2020 and described in the Third Quarterly Report for 2020; this exhaustive exercise was not repeated in 2021 although all return-to-sender postcards are maintained for record keeping.

Using the robust processes in place for occupancy and ownership changes along with continued efforts to investigate return-to-sender occurrences, affected properties receive replacement materials upon reconciliation of the address or the property is removed from the LRP if it is determined to be vacant.

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

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] and 6.B [Comprehensive LRPP Performance Metric] above.*
>
> *Text is taken verbatim from the Order, dated Dec. 16, 2019.*

A summary of the performance metrics that will ultimately be used to evaluate the overall performance of the LRP is presented in Table 28. Summary of Compliance.

TABLE 28. SUMMARY OF COMPLIANCE

Paragraph	Description	Comment
2.C	**C. Corrosion Control Treatment Metric.** Denver Water must consistently maintain in all parts of the System a minimum target pH of 8.5 during the first year of operation under this Variance. In the future, Denver Water must maintain pH and alkalinity within the ranges designated by CDPHE in its modification decision under Section 11.26(3)(d)(ii) of 5 CCR 1002-11.	**See Section 7.B.i**
3.D	**D. LSL Inventory Compliance Metric.** Denver Water must investigate a minimum of 1.4% of the total estimated number of suspected and possible LSLs in the LSL Inventory each Program Year (based on a subset of Y as described in paragraph 3.A above), as adjusted. These investigations are performed independently of the LSL replacements.	**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.	**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 documented 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 performance of the LRPP as implemented continues to be "at least as efficient as" orthophosphate treatment in reducing lead exposure on an annual basis. Denver Water may account for the CCT optimization period in this demonstration.	**See Annual Report for 2020**

7.B.vi Communications, Outreach and Education

Section 7.B.vi of the 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 file minimum:*
>
> *a. a description of outreach activities conducted, including copies of the outreach materials provided;*
>
> *b. a list of any partner organizations who conducted, or were involved in the implementation of the communications, outreach and education plan; and*
>
> *c. if in-person or telephone surveys are conducted, the answers to filter usage survey questions that were asked, and date and time of call.*
>
> *Text is taken verbatim from the Order, dated Dec. 16, 2019.*

During the second six months of 2021, Denver Water continued its public outreach and engagement efforts based on the strategies described in the 2021 COE Plan. This included hosting a series of virtual community meeting on proper filter use, convening the Stakeholder Advisory Committee for two quarterly meetings, and developing new customer resources on water quality sampling, filter use, renter and landlord participation in the Lead Reduction Program and 1983 to 1987 homes outreach. COE efforts specific to each LRP element are also included in those element sections of this report.

TABLE 29. OVERVIEW OF 7.B.VI REQUIREMENTS

Paragraph	Description	Comment
7.B.vi	2020 COE Plan 2021 COE Plan 2022 COE Plan	See First Quarter Report of 2020. See Fourth Quarter Report of 2020. See Appendix.[91]
7.B.vi.a	Description of COE activities conducted. Copy of materials.	Discussed in this section. See Appendices for copies of materials included.[92]
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.[93]
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 and 2021 COE Plans.
LRPP III.F (p 74)	Stakeholder Advisory Committee	Discussed in this section.

Outcomes of COE Activities between June 5 and Dec. 3, 2021 (unless otherwise noted) [7.B.vi.a]

- Denver Water hosted four bilingual, one-hour virtual community meetings in June and July 2021 focused on helping customers get the most out of their Denver Water-issued pitchers and filters. To promote the meeting, 109,150 outbound calls were made to customers enrolled in the Filter Program the day before and the day of the event, with 35,860 bilingual voicemail messages left for those who did not answer.[94] In November, Denver Water also hosted a Spanish-only virtual community meeting to better engage Spanish-speaking customers. The meeting was promoted through community partners and heavily shared on social media. In total, 4,798 customers participated in a virtual community meeting during the last six months of the year.
- In addition, Denver Water received requests for LRP presentations and/or attendance at community events from 17 local, state and national organizations and held these presentations at various times during this reporting period.

[91] See Appendix COE-15 2022 COE Plan.
[92] See Appendices COE-15 to 18, COE-20 to 26, COE-28 and COE-33 to 34 for a copy of materials.
[93] See Appendix FIL-26 Informal Filter Adoption Survey Detailed Responses (Second Six-Month Period of 2021).
[94] See Appendix FIL-21 Informal Filter Adoption Survey Results Summary (Second Six-Month Period of 2021).

- Information was sent to all customers in 1983 to 1987 homes reminding them of the opportunity to request a water quality sampling kit and to all renters and landlords at properties enrolled in the LRP emphasizing the key things they need to do to fully participate in the LRP.[95]
- On Dec. 16, emails were sent to leasing offices at properties in the LRP encouraging them to partner with Denver Water and providing program information and filter kits to new tenants upon move in.
- In August, a filter use reminder postcard was mailed to all Filter Program enrollees to encourage proper filter use and maintenance, fulfilling the requirement for direct contact with at least 95% of Filter Program enrollees each program year.[96]
- The Stakeholder Advisory Committee convened for two quarterly meetings on July 22 and Oct. 21. The meetings included a progress update on the LRP, a report out of progress in 2021, filter adoption survey results, an overview of the 2022 work areas and discussions around suggested community organizations and events for Denver Water sponsorship. The next meeting will be held in January 2022.
- Contact was made on 32 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 243,826 visits and 443,813 page views since the launch of comprehensive LRP information on March 5, 2020.[97]
- LRP TAP stories published on denverwater.org/TAP received 2,465 views.[98]
- Denver Water social media activity reached 140,654 individuals.
- The LRP was mentioned in 27 news media stories, with a potential aggregate readership of 586 million across online news, blogs and television.[99]

In addition to these outreach activities, Denver Water developed its 2022 COE Plan. The plan identifies goals, target audiences and strategies/tactics that will guide COE outreach efforts in the third year of the LRP.[100]

The following section highlights COE program activities carried out in 2021 from June 5 through Dec. 3 (unless otherwise noted), organized by strategy type.

[95] See Appendix HEJ-12 1983 to 1987 Homes Reminder Postcard and Appendix COE-18 Renter/Landlord Postcard Mailer.
[96] See Appendix COE-22 Filter Use Reminder Postcard and Appendix FIL-20 Proof of Outreach to 95% of Customers Enrolled in Filter Program.
[97] See Appendix COE-32 Website Traffic.
[98] See Appendix COE-31 TAP Stories Published.
[99] See Appendix COE-29 Earned Media Report.
[100] See Appendix COE-15 2022 COE Plan.

Public Outreach

Overview of activity grouped by outreach component:

- Virtual Meetings
    - Denver Water hosted four bilingual, one-hour “Getting the Most Out of Your Filter” virtual community meetings on June 17, June 22, July 13 and July 20 for all customers enrolled in the LRP.[101]
    - The meeting was an opportunity to inform customers about the LRP with specific emphasis on encouraging filter use for drinking, cooking and preparing infant formula. Participants learned about tips and tricks to make filter use easier and more convenient.
    - To promote the meeting, 109,150 outbound calls were made to customers enrolled in the Filter Program the day before and the day of the event, with 35,860 bilingual voicemail messages left for those who did not answer. 4,782 customers participated in these meetings.
    - The voicemail provided information about why they were receiving the call, where to learn more about the LRP and how to contact Denver Water Customer Care. Voicemails were recorded in both English and Spanish.
    - In addition, Denver Water hosted its first “Spanish-only” virtual community meeting on Nov. 16. This meeting was a unique opportunity to empower a team of Spanish-speaking presenters, Denver Water staff and community partners, to provide information on the LRP directly to Spanish-speaking customers. This meeting had 16 participants.
    - To promote the Spanish-only meeting, Denver Water created printed and digital materials that were widely distributed on social media and via email with the help of our community partners and key stakeholders, such as Denver City Council offices.
    - Presentations were also made to organizations upon request to provide an overview of the LRP, gather feedback and identify areas for potential coordination. These meetings included the following:
        - Park Hill Garden Walk – Greater Park Hill Community Inc. (June 13)
        - Juneteenth Celebration Street Festival (June 19)
        - University Hills Neighborhood Association (June 12)

[101] See Appendix FIL-21 Informal Filter Adoption Survey Results Summary (Second Six-Month Period for 2021).

- University Hills North Community (Aug. 17)
- Two Creeks Neighborhood (Aug. 21)
- CDPHE Community Advisors Meeting – in collaboration with South Adams County Water & Sanitation District, COPA and the GES Coalition (Aug. 24)
- Overland Park Neighborhood Association (Aug. 26)
- Denver Office of Children's Affairs – Head Start (Sept. 8)
- Jefferson Park United Neighbors (Sept. 14)
- Colorado Environmental Health Association – Annual Conference (Sept. 17)
- La Alma – Lincoln Park Neighborhood Association (Sept. 22)
- One World One Water: Colorado Water Issues, Local Action (Sept. 30).
- Congress Park Neighbors (Oct. 20)
- Capitol Hill United Neighbors (Oct. 28)
- Villa Park Neighborhood Association (Nov. 10)
- Lead and Healthy Housing Conference (Dec. 1)
- Mile High Rotary Club (Dec. 7)

- Stakeholder Advisory Committee
  - The Stakeholder Advisory Committee met for its second and third quarterly meetings of 2021 on July 22 and Oct. 21.
    - Representatives reflected a diverse group of organizations including health care, education, nonprofit and government.[102]
    - At the July meeting, Denver Water provided an overview of LRP progress and a deep dive on the grasstops and grassroots outreach and engagement efforts being deployed to reach enrolled customers. The meeting also included a discussion that encouraged Stakeholder Advisory Committee members to suggest community organizations and/or events that Denver Water should consider for its sponsorship awards program.
    - A key outcome of these discussions with the Stakeholder Advisory Committee is a partnership between Denver Water and the Denver Health Foundation to include information about the LRP in newborn baskets, distributed to about 3,600 families per year.

[102] See Appendix COE-19 Stakeholder Advisory Committee Membership List.

        - At the third quarterly meeting on Oct. 21, Denver Water provided an update on LRP progress, a preliminary report out of the 2021 filter adoption survey results and an overview of the 2022 work areas.

- Government Relations
    - 32 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.
    - Outside of the proactive updates, staff continues to be responsive to questions from government officials, as needed.
- Distributor Communications
    - Distributor forum meetings were held on Aug. 17 and Nov. 16 to provide updates on the LRP.
    - Updates on the LRP were published in the September distributor newsletter.
    - In 2021, Denver Water has been working with the City of Edgewater and Bancroft-Clover Water & Sanitation District to support their capital projects that incorporate lead service line replacements, including providing material templates to support communication with customers.
    - 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 streamlined its internal coordination to better identify opportunities to enhance distributor-related efforts and customer participation.
- Paid Media
    - The 2021 paid media strategy was continued to promote the LRP with focus on areas where residents may not be using filtered water as commonly as others, per the 2020 filter adoption survey results.
    - Following a successful campaign in spring 2021, a second campaign ran from Aug. 2 through Sept. 6 and a third campaign ran from Nov. 1 through Dec. 5.[103]

[103] See Appendix COE-30 Paid Digital Media Campaign Overview.

        - The August to September campaign generated 2,945,183 total impressions through digital media, driving over 31,000 visits to the LRP website.
        - The November to December campaign generated 4,093,665 total impressions through digital media, driving over 30,000 visits to the website.

- Earned Media
    - The LRP was covered in digital, print and broadcast news, including the Denver Post, Yahoo News, YourHub, Treatment Plant Operation and American City and County.[104]
    - There were 35 posts about the LRP on social media channels in this reporting period, resulting in 140,654 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. 1 and Dec. 16 to a growing database of 10,709 subscribers who have opted in for LRP news. These emails were also sent to 62,692 customers who had been contacted to participate in previous virtual community meetings. Emails promoted engagement opportunities, encouraged proper filter use and the completion and return of water quality sampling kits.[105]
    - Four TAP stories were published on denverwater.org/TAP, which included content related to the LRP. As of Dec. 3, these stories received a total of 2,465 views.[106]
    - The LRP website, denverwater.org/Lead, was updated with the recordings of the "Getting the Most Out of Your Filter" virtual community meetings, filter-use FAQs, dashboards, an updated lead service line inventory and an updated pipe replacement map with the work areas for 2022. Since the launch of the LRP, the website has received 243,826 visits and 443,813 page views. There were 38,785 unique website visitors from June 5 to Dec. 3, 2021.[107]
    - Additionally, to provide more accessible information on water quality sampling, Denver Water updated the LRP website with a new page dedicated to helping customers quickly find information about water quality sampling kits. The page provides information about why customers may receive a kit, how to properly

[104] See Appendix COE-29 Earned Media Report.
[105] See Appendix COE-28 September and December Subscriber Email.
[106] See Appendix COE-31 TAP Stories Published.
[107] See Appendix COE-32 Website Traffic.

collect and return water samples, and how to understand the results of the water test.

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

The following materials were developed through Dec. 3, 2021:

- The public-facing dashboard was updated to share progress and key metrics for the LRP through Nov. 30, 2021.[108] The updated dashboard is posted monthly to denverwater.org/Lead and is available in both English and Spanish.
- Information on the LRP was included in the June, July, August, October and December issues of WaterNews, the monthly bill insert included with the bills of more than 180,000 customers who receive a bill from Denver Water. The information covered proper filter use, water quality sampling, outreach and engagement efforts, community partner work and rates increase as it relates to the LRP.[109]
- Service Line Investigations
    - Email content and a call script were developed to notify customers identified for upcoming investigation potholing and interior inspection activities of the work and what they need to know and/or do.[110]
    - A results letter was created to share investigation results with these customers. A postcard was created to remind customers in 1983 to 1987 homes of the opportunity to request a water quality sampling kit, serving as a simplified and more engaging mailer than the original letter provided in 2020.[111]
- Filter Program
    - A postcard was developed to target renters and landlords at properties enrolled in the LRP, highlighting the top things each audience needs to do (or know) to fully participate in the LRP.[112]
    - An additional filter cartridge replacement package insert was developed to share tips and tricks for getting the most out of the filter, based on feedback received from customers in the filter adoption survey and virtual community meetings. Information focused on how to properly and more easily use filtered water for cooking and proper filter use and maintenance.[113]

[108] See Figure 1.
[109] See Appendix COE-17 June, July, August, October and December Issues of WaterNews.
[110] See Appendix COE-33 Investigative Potholing Email and Call Script.
[111] See Appendix COE-34 Investigative Potholing Results Letter.
[112] See Appendix COE-18 Renter/Landlord Postcard Mailer.
[113] See Appendix COE-21 Filter Cartridge Replacement Packet Tips and Tricks Insert.

- A filter use reminder postcard was mailed to all enrollees in the Filter Program to emphasize the importance of and encourage proper filter use and maintenance.[114]

- Water Quality Sampling
  - To support the distribution of water quality sampling kits aimed at refining the inventory and predictive model, a postcard was created to notify those customers that they would soon be receiving a water quality sampling kit and encouraging them to return samples for analysis.[115]
  - A robocall script and email were also developed to remind these customers to return water quality samples for analysis if samples had not been received after distribution of the kits.[116]

Internal Communications and Coordination

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

- Internal trainings and information-sharing sessions continued to be held as needed or requested to update Denver Water teams and departments on the LRP and prepare them for handling customer or community inquiries as appropriate.

- 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.

[114] See Appendix COE-22 Filter Use Reminder Postcard and Appendix FIL-20 Proof of Outreach to 95% of Customers Enrolled in Filter Program.
[115] See Appendix COE-24 Water Quality Investigative Notice Mailer.
[116] See Appendix COE-25 Water Quality Test Kit Robocall Script and Appendix COE-26 Water Quality Test Kit Reminder Email.

Above and Beyond Stories

- In late June, an elderly couple reported water pressure issues after their service line replacement, which the contracting team identified as related to galvanized plumbing. While the contracting team could talk the customer through possible recommendations, they could not follow up with physical assistance. Understanding that the couple was elderly, and the husband had dementia, the contracting team worked with Denver Water to send a plumber to the property to provide in-person support. The plumber was able to get the toilets, bathtub and washing machine working properly. The plumber also provided information that would be helpful if the customers decided to move forward with replacing their internal plumbing.
- Throughout 2021, Denver Water has hand-delivered water pitchers and filters to customers in special circumstances to expedite delivery and ensure the customer is receiving the item, even though mail delivery would still meet regulatory requirements for distribution timing. Most often, hand delivery occurs when a customer has previously requested a replacement item and reports they have still not received it despite tracking reports showing delivery, indicating items may be getting stolen from doorsteps. As of August 2021, 377 replacement cartridges and 827 filter kits had been delivered by hand. Customers have expressed their appreciation for this above and beyond service.

7.B.vii Health Equity and Environmental Justice

Section 7.B.vii of the 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 health equity and environmental justice (HE&EJ) principles set forth in the LRPP, including:*
>
> *a. 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;*
>
> *b. socioeconomic or demographic data collected through the survey that may inform the filter adoption rate by neighborhood or demographic group to the extent practical;*
>
> *c. socioeconomic or demographic data collected from or other 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; and*
>
> *d. documentation that outreach and education materials have been provided to at least 95% of the households enrolled in the filter program.*
>
> *Text is taken verbatim from the Order, dated Dec. 16, 2019.*

A commitment to HE&EJ informs all aspects of the LRP, supporting accessibility, awareness and equitable participation for all customers. An overview of HE&EJ reporting requirements is presented in Table 30.

TABLE 30. 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.	See Annual Report. 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 and demographic data collected through the filter adoption survey.	To be presented in annual report.
7.B.vii.c	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.d	Documentation that outreach and education materials have been provided to at least 95% of the households enrolled in the Filter Program.	See Section 7.B.vi.a. See letter sent on Aug. 9, 2021. See Appendix.[117]
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.	See this section.
LRPP V (p 79)	Collaborate with other agencies to address lead exposure from all sources.	Described in this section.

The following sections describe how HE&EJ principles were integrated into the various components of the Lead Reduction Program during the second half of 2021.

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

Ambassador Program

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

- **Contract Partners**: Conduct extensive on-the-ground outreach using culturally appropriate messaging with tailored outreach strategies to reach enrolled customers in prioritized communities.

[117] See Appendix FIL-20 Proof of Outreach to 95% of Customers in Filter Program.

- **Sponsorship Awards:** The sponsorship awards initiative launched in 2021 and provides funding to community organizations to either leverage their existing programs/services/events or create new opportunities to promote the LRP in targeted communities.
- **Information Partners**: Community organizations are recruited for their willingness to use their communication channels to promote the LRP.

Contract Partners

- CREA Results is a community organization that specializes in the Latinx community. This group supported community outreach activities in the following neighborhoods:
    - Barnum/Barnum West
    - Globeville
    - Elyria-Swansea
    - Park Hill
    - Whittier
    - West Highland
- During the second six months of 2021, CREA Results engaged in the following work:
    - Placed materials at 100 locations to promote the LRP through selected organizations and businesses with an estimated reach of 4,000 people.
    - Participated in 37 in-person or virtual events to educate residents within six targeted neighborhoods about the LRP with an estimated reach of 4,263 people.
    - Conducted email, phone and/or door-to-door outreach to 141 customers in Globeville and Elyria-Swansea to secure consent forms for lead service line replacements.
    - Conducted 10 educational workshops or other unique activities to promote the LRP.
    - Gathered insights from 29 people who spoke Spanish on filter use and conducted an additional 18 follow-up conversations to confirm behavior change and/or barriers preventing behavior change.
    - Provided recommendations on material updates to make messaging as accessible and engaging as possible for Spanish-speaking community members.
    - Increased public service announcement messages from a total of eight to 16 to messages to promote the LRP.
    - Hosted five radio shows about the LRP on KNRV (1150 AM), a Spanish language radio station, with an estimated reach of 300,000 listeners.

- Secured 11 print stories in two Spanish language publications (El Comercio de Colorado and El Pueblo Catolico) with a combined distribution of 205,000 readers per issue.[118]
- Secured an interview on Estrella TV, a Spanish language television show, whose Facebook followers total 16,467, indicating robust viewership for the show.
- Posted LRP information on Facebook 91 times with an estimated 5,288 views.
- Posted four LRP videos in Spanish on CREA's Facebook page, which has 1,592 followers.[119]

An example of CREA Results in action and the impact of their efforts:

- CREA Results conducted canvassing in the Elyria-Swansea neighborhood and visited an elderly man who confirmed he had received a water pitcher and filter but was not using it because he purchased bottled water from the grocery store. When asked if he uses filtered water for cooking he asked, "Do I need to?" The team explained that lead cannot be boiled out of water and that the only way to remove lead is to use a filter designed to do so. He invited the team inside to show him how to use the water pitcher and filter. He promised he would use the filter going forward and thanked the team for visiting him.

- iNOW is a community organization that specializes in supporting immigrant populations from Africa and Asia. This group provided support across all targeted LRP neighborhoods in the following languages:
  - Amharic
  - Arabic
  - French
  - Nepali
  - Somali
- During the second six months of 2021, iNOW engaged in the following work:
  - Served as a resource to provide LRP information to enrolled LRP customers in five languages through the virtual help desk.
  - Supported an in-person event to distribute information at the Urban Leadership Foundation of Colorado's Thanksgiving in July event.

[118] See Appendix HEJ-9 Ambassador Partner Spanish Language Articles.
[119] See Appendix HEJ-8 CREA Results Videos.

- Gathered insights on filter use from 21 non-English and non-Spanish speaking community members.
- Posted new videos in six languages to promote "Cooking with Filtered Water" for Thanksgiving and holiday meals in November 2021. The videos reached 2,189 people on Facebook.[120]

An example of iNOW in action and the impact of their efforts:

- A water pitcher and filter were sent to a customer who speaks French but couldn't read the English or Spanish information included in the filter kit. She kept the pitcher for months until meeting an iNOW community navigator who explained the LRP and the importance of filtering water before cooking, drinking and making infant formula. The woman was asked to complete an informal filter adoption survey and confirmed that she is now regularly using her pitcher.

- Dope Mom Life specializes in creating messaging for the African American community. This group led community outreach efforts in the following neighborhoods:
  - North Park Hill
  - Five Points
  - Clayton
- During the second six months of 2021, Dope Mom Life engaged in the following work:
  - Conducted four interviews with African American community and business leaders about the LRP.
  - Conducted three interviews with African American community organizations about the LRP.
  - Hosted four community engagement events/activities to promote the LRP with a combined total of 39 participants.
  - Conducted four informal filter adoption surveys to gather insights on filter use and to confirm behavior change or barriers preventing behavior change.
  - Recruited and trained an influential community member to promote the LRP in the African American community.
  - Held 37 individual conversations with community members.

[120] See Appendix HEJ-7 iNOW Videos Link.

An example of Dope Mom Life in action and the impact of their efforts:

- A community meeting was held in the Five Points neighborhood to explain the Lead Reduction Program to a small group of residents who were misinformed about the program's reimbursement options. Residents falsely believed that they had to pay to have their lines replaced. Denver Water staff reassured participants that lead service line replacements are free, but if homeowners wanted to have their lines replaced sooner, they had the option to arrange for the replacement on their own and that Denver Water would reimburse a portion of the cost. Residents were thrilled to learn it did not cost them anything out of pocket and immediately began to focus on how they could work with Denver Water to provide accurate information in the African American community.

Sponsorship Awards

During the last six months, the following community organizations participated in this new level of the Ambassador Program:

- Food Bank of the Rockies, the largest hunger relief organization in the Rocky Mountain region.
    - Distributed flyers about the LRP to 5,534 households through churches, senior centers, health clinics, Salvation Army locations and other mobile pantry sites within Denver Water's service area.[121]
    - Posted LRP information on Twitter, which generated 177 views.
    - Posted LRP information on Facebook that reached an estimated 429 people.
- Women's Bean Project, a nonprofit with the mission to change women's lives by providing stepping-stones to self-sufficiency through social enterprise.
    - Posted bilingual LRP flyers in their retail store promoting use of filtered water, particularly for cooking. Since posting, over 200 community members have been in the store to see the information.
    - Inserted over 600 LRP flyers within three months in order shipments to targeted LRP ZIP codes.
    - Shared information in their summer e-newsletter promoting filter use.
    - Provided Denver Water with 500 soup boxes to distribute at community events in support of the LRP.
    - Presented an overview of the LRP to 30 Women's Bean Project staff on Dec. 6.

[121] See Appendix HEJ-11 Food Bank of the Rockies Flyer.

Information Partners

- Denver Museum of Nature and Science, the Rocky Mountain region's leading resource for informal science education.
    - Shared LRP information in their e-newsletter targeted to customers within Denver Water's service area.
    - Posted information to their Facebook page with over 145,000 followers.
- NEWSED, a community development corporation focused on solving long-term economic problems in disadvantaged communities by securing and coordinating resources for neighborhoods.
    - Posted LRP information on Facebook, which reached an estimated 97 people.
    - Created a partnership webpage featuring LRP videos in Spanish and TAP articles on the NEWSED website, reaching an estimated 34 people. The partner webpage also included a direct link to the LRP website.
    - Provided LRP information to 68 clients.

A bilingual community partner refresher training was held on Aug. 20, 2021, to review progress and core elements of the LRP and support responding to customer inquiries.

Virtual Community Meetings

Spanish interpretation has been available for every virtual community meeting conducted through 2020 and 2021, including the "Getting the Most Out of Your Filter" meetings in June and July 2021. All meetings were fully bilingual, from the initial meeting promotion to the meeting presentation, poll questions and Q&A responses. The meeting recording is also available in both Spanish and English denverwater.org/Lead.

Denver Water also conducted its first Spanish-only meeting on the LRP in November 2021. This meeting featured a Spanish-speaking presentation team comprised of Denver Water staff and a staff member from CREA Results that allowed Spanish-speaking customers enrolled in the Filter Program the opportunity to learn about the program directly, as opposed to through an interpreter.[122] This meeting recording is available at denverwater.org/Plomo.

Critical Customer Outreach

A combination of outreach efforts, including mailing, email, phone calls and door knocking was conducted in the second half of 2021 to complete more lead service line replacements at critical customer facilities such as schools and child care centers. These efforts have exceeded the baseline of two mailings and a door knocking as Denver Water continues to work to gain consent for all critical customer facilities.

[122] See Appendix HEJ-10 Spanish Virtual Community Meeting Promotional Flyer.

Materials

In November 2021, Denver Water launched the Spanish version of the LRP website. To access the Spanish content, customers may simply click on the green "Español" button in the top right-hand corner of the home page or visit denverwater.org/Plomo.

All customer-facing materials produced in 2021 were translated into Spanish. The "Getting the Most Out of Your Filter" virtual community meeting 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/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.

Following previously sent letters, an email was distributed to larger apartment complexes to remind them of this opportunity to work with Denver Water to make the more accessible for tenants.

Early Childhood

In 2021, Denver Water developed a youth education and outreach plan that prioritizes two audiences: early childhood and elementary age children (and those providing services to these children and families. The plan lays the groundwork for implementation in 2022.[123]

In consultation and collaboration with Denver's Early Childhood Council, two virtual trainings were conducted, one in English (with four attendees) and one in Spanish (with 14 attendees), for child care providers to educate them on the LRP and how to participate in and support the LRP at their facilities.

A partnership was also formed with the Denver Health Foundation to include information about the LRP in their newborn baskets which are distributed to all families after delivering their babies at Denver Health. Denver Health distributes approximately 3,600 newborn baskets a year.

On Dec. 8, Denver Water distributed an infant formula reminder card to the 41 respondents to the 2021 filter adoption survey who had reported that they have a formula-fed infant to emphasize the importance of using filtered water to prepare infant formula.[124]

Denver Water also actively partnered with the Denver Great Kids Head Start program, as well as other school programs, to train their staff on water quality sampling and sample collection so they can identify potential sources of lead, properly evaluate results in drinking faucets and fixtures and take action for remediation as needed.

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[123] See Appendix COE-16 Youth Outreach and Engagement Plan.
[124] See Appendix COE-23 Infant Formula Reminder Card.

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

To apply the HE&EJ principles to the LRP, a prioritization model is used to target specific neighborhoods and underserved communities as part of the ALSLR planning process. The prioritization model is a risk-based approach that is used with long-term construction activity planning to account for the likelihood of lead service lines in a given area, potential for health consequences, sociodemographic indicators, and logistical constraints or opportunities related to construction. The model relies on several datasets, including the state's census tracts and sociodemographic data, to identify neighborhoods for prioritization of LSL replacements.

The prioritization process relies on integrating (a) the likelihood of having a lead service line based on the designation in the Inventory as a possible, suspected, or known lead service line and (b) factors that measure the consequence of potential exposure to lead in drinking water, including socioeconomic factors. The sociodemographic data factors used in the model include an area-based distribution of household income, minority status, and participation in the state's Women, Infants and Children (WIC) program, while the potential for health consequences factors include blood lead levels (BLL), relative prevalence of expecting families and age (i.e., children).

A comprehensive list of geographic areas is then generated along with a second list of individual properties with a high risk of lead exposure. These lists are refined and then reviewed with other scheduled construction projects (including paving) to identify synergies. Once work areas are identified from the prioritization model, neighborhoods are compared against the City and County of Denver's neighborhood equity index map. This additional step provides further verification that the LRP is focused on areas facing higher levels of inequity based on the area of overlap between the prioritization model and the neighborhood equity index.

2022 ALSLR Work Areas

To leverage 2021 efforts for community outreach and education and complete replacements in existing neighborhoods, the neighborhoods prioritized in 2021 were expanded for the 2022 ALSLR Plan if the area aligned with the prioritization model. As a result, 2022 work areas are centered around continuing replacements in seven communities from the 2021 ALSLR Plan (Barnum, Barnum West, Congress Park, Elyria-Swansea, East Colfax, Globeville, and Park Hill) and two communities from the 2020 ALSLR Plan (City Park and Clayton).

It is important to note that, based on logistical and construction constraints, properties from some neighborhoods included in the 2021 ALSLR plan may not have had their LSL replaced and will therefore require the replacement to be scheduled sometime in the future. 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 or a delayed return of consent forms.

Three 2020 and 2021 neighborhoods, Washington Park, Baker and Whittier, were not included in geographic work areas for the 2022 ALSLR Plan; however, there are some individual properties in these neighborhoods included in the 2022 plan. These properties are part of a rollover plan that aims to address properties with a signed consent form that were delayed due to logistical constraints or the late submittal of the consent form by wrapping them into the upcoming year's replacements. Meanwhile, properties that did not provide consent in 2021 have been deferred to future planning. The two neighborhoods as a whole did not make the 2022 work area list because the prioritization model revealed that other neighborhoods posed a higher risk for lead exposure. The remaining properties with lead service lines in the Baker and Whittier neighborhoods will be monitored in the prioritization model for future years as the model is updated to reflect the general progress of the LRP.

In addition to the continuation of work in select neighborhoods from the 2021 plan, two new neighborhoods were included in the 2022 ALSLR Plan. The Skyland and Villa Park neighborhoods were identified as high priority in the 2022 prioritization model and had few logistical constructability constraints. Therefore, one work area in Skyland and one work area in Villa Park were identified for replacements in the 2022 ALSLR Plan.[125]

The 2022 ALSLR Plan was reviewed with stakeholders, including within and outside of Denver Water, the LRP Stakeholder Advisory Committee, the City and County of Denver and CDPHE. Prior to the start of customer communications, upcoming work areas were communicated to elected officials, distributor partners and other key external stakeholders for information.

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

All customers enrolled in the Filter Program received their initial filter kit in 2020 with enough replacement filters to last approximately six months. The distribution of additional replacement filters began on Aug. 27, 2020, an approximate five-month cycle following the same schedule used for the initial filter distribution. This distribution continued in 2021.

In 2020, outreach was conducted with leasing offices to support providing filter kits and program materials to new tenants on move-in. This outreach continued in 2021 as described earlier in this section.

The results of the 2020 filter adoption survey were analyzed to identify sociodemographic factors that may correlate to lower or higher filter adoption. Strategies and efforts to target those communities with lower adoption rates and address key themes from the survey are described in other reports.[126]

[125] See Appendix HEJ-11 2022 ALSLR Prioritization.
[126] See COE section of this report, the First Semi-Annual Report of 2021, and the 2021 COE Plan.

Learning by Doing

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

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

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

This means that Denver Water incorporates the Learning by Doing approach to improve outcomes during the life of the LRP. During the second six months of 2021, efforts continued to identify potentially more efficient or effective ways to implement the LRP in the Learning by Doing log. The outcomes tracked in the Learning by Doing log are presented as an independent report at the end of each program year.

The following are Learning by Doing activities from the second six months of 2021:

- In the fall of 2020, an initial, detailed letter was sent to all customers in select households to notify these customers of the opportunity to request a free water quality sampling kit and, based on the results, obtain a free filter kit from Denver Water to use in preparing infant formula. Customer response to this mailing was minimal and produced few water quality sample results meeting the threshold for requesting a filter kit. In late fall 2021, a reminder postcard was sent to this same demographic. The postcard was high-level and included more visuals to support more engaging and easy-to-digest messaging. The postcard also directed customers to the Denver Water website for more information.
- Denver Water coordinates directly with the Office of the City Forester (OCF) to address and manage potential tree conflicts that would interfere with the replacement of a service line. A list of potential tree conflicts was developed prior to releasing the notice to proceed to contractors for each task order. If a replacement unexpectedly interfered with a tree's root zone, the contractors had to stop work, call OCF to assess the property and wait for recommendations from OCF before proceeding. To improve efficiencies, Denver Water is hiring a Professional Arborist for 2022 LSL replacement work. To accommodate the LRP, OCF agreed that the professional arborist could make decisions on behalf of OCF, provided that regular updates are reported to OCF. Denver Water and OCF are currently drafting a standard operating procedure for implementation in 2022.

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