

DENVER WATER LEAD REDUCTION PROGRAM

SEMI-ANNUAL REPORT – S1 2021

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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 December 16, 2019 Variance and the November 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 first six months of 2021 for the period of January 1 through June 30, 2021. During this time period, Denver Water has provided five monthly reports for January 2021, February 2021, March 2021, April 2021, May 2021 and June 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).

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 January, February, March, April, May and June 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 June 30, 2021, using data current up to June 4, 2021.
7.B.iii LSL Replacements (aka ALSLR Program)	This section summarizes the number and type of replacements completed. Denver Water’s own forces have been replacing lead service lines since January 1, 2020. Contractors started lead service line replacement on March 5, 2020.

¹ See Appendix REG-1 Copies of Letters for Compliance-Related Submissions (First Six-Month Period of 2021).

7.B.iv Filters (aka Filter Program)	This section summarizes filter distribution. Initial filter distribution was completed by September 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 Denver Water’s efforts to implement the 2021 COE Plan, ² continue engagement with the Stakeholder Advisory Committee and develop new customer resources and materials.	
7.B.vii Health Equity and Environmental Justice	This section summarizes Denver Water’s implementation of the COE Plan, updates on partnerships with iNow and CREA Results, ³ and outreach.	
Additional Requirements and Miscellaneous Deliverables	This section summarizes submissions to EPA and CDPHE identified in the LRPP. ⁴	
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	

The reporting dates for the different program elements are shown in Table 2. In general, data shown for the first six months of 2021 include the period of January 1 to June 4, 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). Separate appendices are provided to report data after December 4, 2020, (the end of the reporting period for the fourth quarter of 2020) and December 31, 2020, (before start of reporting period for this report). This mostly affects reporting for filter requirements,⁵ with data for the inventory and replacements provided in the 2020 Annual Report and CCT performance and other water quality results described in the December 2020 monthly report.

² See Appendix COE-H.1 in the Fourth Quarterly Report (submitted January 8, 2021).

³ iNOW, formerly the Colorado African Organization, is a community organization that specializes in supporting refugee and immigrant populations from Africa and Asia. CREA Results is a community organization that specializes in the Latinx community.

⁴ See Appendix REG-1 Copies of Letters for Compliance-Related Submissions (First Six-Month Period of 2021).

⁵ See Appendices FIL-1A, FIL-2A, FIL-3A, FIL-5A, FIL-6A, FIL-7A and FIL-9A.

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

Description	Fourth Quarterly Report (2020)	First 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 July 1 to December 31 All customer requested samples reported in LIMS ¹ between September 19 and December 4	All LCR samples collected from January 1 to June 30 All customer requested samples reported in LIMS between January 1 and June 30
Elevated Lead Response Reporting	September 19 to December 4	January 1 to June 4 ²
Water Quality Sampling from Select Households (1983 to 1987 Homes)	September 19 to December 4 Outreach launched August 21, 2020	January 1 to June 4
Inventory – Posting of Map to Denver Water’s Website	Data through December 4 Posted December 24	Data through June 4 Posted June 30
Inventory – Update	September 19 to December 4	January 1 to June 4
Investigations – Verification Potholing as Part of ALSLR Program	September 19 to December 4	January 1 to June 4
Investigations – Investigative Potholing Independent of ALSLR Program	None performed	January 1 to June 4
Investigations – Water Quality Sampling as part of ALSLR Program (not included in 90th Percentile Calculation)	All results reported in LIMS from January 25 to December 4	All results reported in LIMS from January 1 to June 4
Investigations – Water Quality Sampling Independent of ALSLR Program (not included in 90th Percentile Calculation)	All results reported in LIMS from June 4 to December 4 (Sampling initiated June 4)	All results reported in LIMS from January 1 to June 4 ³
Water Quality Sampling Post-LSL Replacement	All results reported in LIMS from May 13 to December 4	All results reported in LIMS from January 1 to June 4 ³
ALSLR Program Replacements	September 19 to December 4	January 1 to June 4
ALSLR Program Consent Forms	September 19 to December 4	January 1 to June 4
Initial Filter Distribution	September 22 to December 4	January 1 to June 4
Replacement Filter Distribution	September 19 to December 4	January 1 to June 4
Filter Program Occupancy Changes⁴	September 19 to December 4	January 1 to June 4
Informal Filter Adoption Survey as Part of ALSLR Program	September 19 to December 4	January 1 to June 4
Filter Testing in the Field	September 22 to November 20	January 1 to June 4
COE Activities	September 19 to December 4	January 1 to June 4

¹ LIMS is the Laboratory Information Management System used by Denver Water.

² For samples collected and reported in LIMS by June 4 and follow-up response by June 30, 2021.

³ See December 2020 monthly report for sample results reported in LIMS between December 5 and 31, 2021.

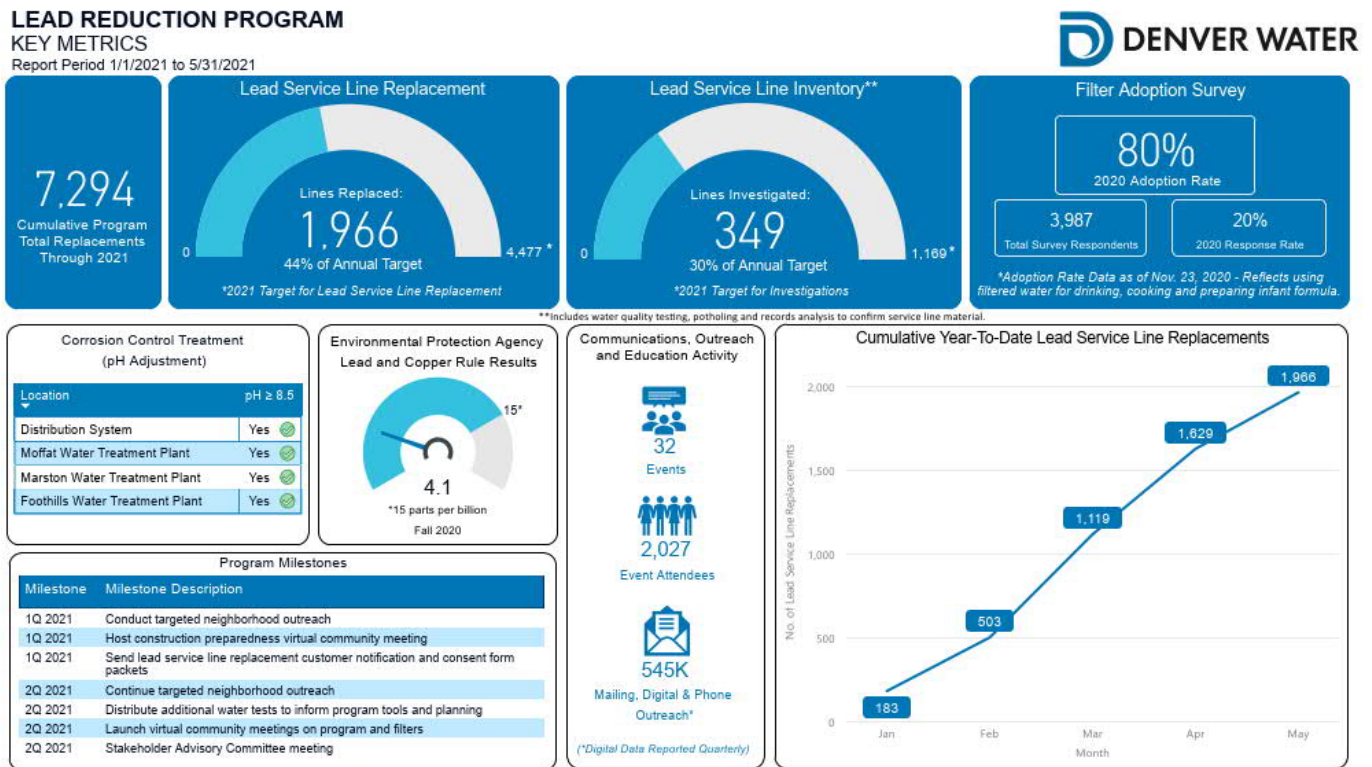
⁴ Includes occupancy changes at ALSLR properties by definition.

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 June 30, 2021, in both English and Spanish, including data through May 31, 2021.⁶ 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 MAY 31, 2021)



⁶ See the Second Quarterly Report (2020) 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 first 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.*

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 January through June 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. ⁷
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 ⁸ for January through June 2021 submitted previously.
LRPP III.E (p 70)	Monthly trending of LCR compliance samples and customer requested samples.	See monthly reports ⁸ for January through June 2021.
7.B.i.d	CCT parameters for pH and alkalinity, reported monthly.	See Table 6. See monthly reports for January through June 2021. ⁸ CDPHE confirmed setpoints on June 9, 2021. ⁹
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 January through June 2021. ⁸ 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 August 21, 2020. See Table 9.
LRPP III.E (p 71)	Complete distribution system modeling, evaluating pH, disinfection by-products and water age by January 31, 2020. Submit nitrification control plan by June 30, 2020, to address sampling, monitoring and flushing.	Submitted July 6, 2020. Re-submitted January 22, 2021.
Voluntary	Results from continued operation of the pipe racks.	Submitted February 23, 2021.

⁷ See Appendix CCT-1 Summary of Response to Elevated Lead Levels (First Six-Month Period of 2021).

⁸ See Appendix REG-1 Copies of Letters for Compliance-Related Submissions (First Six-Month Period of 2021).

⁹ 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 first 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.¹⁰ 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.¹¹ Lead was measured above 25 µg/L in six samples during the reporting period for the first six months of 2021.

TABLE 4. COUNT OF PROPERTIES WITH ELEVATED LEAD CONCENTRATIONS IN LCR AND CUSTOMER REQUESTED SAMPLES¹

Description (Based on Sampling Date)	January 2021	February 2021	March 2021	April 2021	May 2021	June 2021	Response
Properties with Lead >25 µg/L in <u>first 1 L sample bottle</u>	0	1	0	0	1	0	Reported to CDPHE within 10 days and again in monthly report. See Appendix. ¹²

¹ Although the Elevated Lead Response Plan applies only to LCR and eligible customer requested samples, the features of the plan are applied to results generated from pre-LSL replacement water quality samples obtained from properties included in the LRP for a consistent customer experience. The actions taken at these properties to investigate elevated lead are described in Appendix CCT-1 per the definition used in the Order. Data reflect samples collected through June 4, 2021, with actions updated through June 30, 2021.

¹⁰ See Appendix CCT-1 Summary of Response to Elevated Lead Levels (First Six-Month Period of 2021) for elevated lead measured in the first bottle of the 3-bottle test.

¹¹ See Corrosion Control Implementation Plan re-submitted to CDPHE on June 4, 2020.

¹² See Appendix CCT-1 Summary of Response to Elevated Lead Levels (First 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 January through June 2021.¹³ Data used to calculate the 90th percentile lead concentration in the first 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 spring 2021 compliance period (January 1 through June 30, 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 (JANUARY 1 TO JUNE 30, 2020)

LCR Compliance Results for Lead – Spring 2021 Compliance Period	Result	Number of Homes
LCR Compliance 90th Percentile Lead¹	3.6 µg/L	112
Overall 90th Percentile Lead Concentration using LCR Compliance + Customer Requested Samples²	4.0 µg/L	483 (112 + 371)

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 January 1 and June 30, 2021, compliance period.

² Includes results from customer requested sample in LIMS between January 1 and June 30, 2021. Data are provided to CDPHE as part of the monthly reports. Water quality sampling conducted to support the ALSLR Program are excluded from the compliance calculation by definition.

These results 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 January 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 August 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, $8.8 \pm$

¹³ See Appendix REG-1 Copies of Letters for Compliance-Related Submissions (First Six-Month Period of 2021).

0.3 for pH in the distribution system, and alkalinity greater than or equal to 20 mg/L as CaCO₃, all effective July 1, 2021.¹⁴

TABLE 6. MONTHLY DAILY AVERAGE MINIMUMS FOR WATER QUALITY PARAMETERS¹

Description	January 2021	February 2021	March 2021	April 2021	May 2021	June 2021
Variance Requirement	pH ≥ 8.5 in all parts of the system.					
Marston Water Treatment Plant Effluent	8.79	8.83	8.82	8.81	8.81	8.81
Foothills Water Treatment Plant Effluent	8.81	8.83	8.83	8.80	8.80	8.81
Moffat Water Treatment Plant Effluent	N/A ²	8.80	8.79	8.77	8.81	8.79
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 was out-of-service during the month of January.

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 lead¹⁵). The 3-bottle test is performed¹⁶ 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 < 1¹⁷).
- To inform the inventory and predictive model at properties in the City and County of Denver with a suspected (i.e., p-value ≥ 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).¹⁸
- To validate customer comments on the presence (or absence) of a lead service line and requests to opt in (or out of) the LRP.

¹⁴ See Appendix REG-1 Copies of Letters for Compliance-Related Submissions (First Six-Month Period of 2021).

¹⁵ See discussion in Section 7.B.ii LSL Inventory.

¹⁶ See individual monthly reports for details and results for pre-LSL replacement sampling efforts.

¹⁷ Prior to July 22, 2020, kits were only sent to properties with p-values of 0.5 to 0.7. Since then, kits are sent to all properties with a p-value of 0.5 to 0.9. Any property with a p-value < 1 undergoes verification by field investigation(s) before initiating replacement of the service line, such as a visual inspection of materials in the building interior and/or potholing on the exterior.

¹⁸ 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.¹⁹

TABLE 7. SUMMARY OF WATER QUALITY RESULTS¹ 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 Out²	6,823	Kits
Total Number of Kits Received and Analyzed to Investigate the Service Line Material³	1,737	Kits
Maximum Lead Concentration Measured Year-to-Date⁴	196	µg/L
Average Lead Concentration (in second and third bottles only)⁵	1.65	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 December 5 and 31, 2020, can be found in the December 2020 monthly report.

² Six kits were shipped by Denver Water’s Water Quality Laboratory starting January 1, 2021. An additional 6,817 kits were shipped by the LRP contract laboratory starting January 1, 2021. If a sampling kit is re-sent to a property, it is counted twice.

³ As reported in LIMS between January 1 and June 4, 2021, for sample kits from samples collected in 2021 are included in the metric. See the December 2020 monthly report for results reported in LIMS between December 5 and 31, 2020.

⁴ The highest value measured in the first six months of 2021 was 196 µg/L (measured in Bottle 1); this property had the service line replaced on March 27, 2021.

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 December 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 January 1 and December 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-LSLR replacement sampling inviting the customer to request a sampling kit. The letter was sent to every unit in a multi-unit building.

¹⁹ The threshold used as an indicator for a lead service line has been 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 January 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. This means that properties where the LSL replacement was completed in December 2020 received a sample kit in April 2021 and properties where the LSL replacement was completed in January 2021 received a letter in April 2021 offering sampling. A summary of post-LSL replacement sampling results is provided in Table 8.²⁰

TABLE 8. SUMMARY OF POST-REPLACEMENT SAMPLING OFFERS AND WATER QUALITY RESULTS AFTER LSL REPLACEMENT

Water Quality Sampling after LSL Replacement	Count ¹						TOTAL
	Jan 2021	Feb 2021	Mar 2021	April 2021	May 2021	Jun 2021	
Total Number of Letters Mailed to Offer Post-LSL Replacement Sampling^{2,3}	225	208	194	129	412	324	1,492
Total Number of Kits Mailed Out^{2,3}	1,990	722	566	47	32	3	3,360
Total Number of Kits Received and Analyzed to Confirm post-LSL Replacement Water Quality^{2,4}	269	364	238	189	57	1	1,118
Total Number of Kits Received and Analyzed to Confirm post-LSL Replacement Water Quality Not Previously Reported	109	--	--	--	--	--	109
Number of Properties with Lead > 15 µg/L in First Bottle² (triggers additional investigation effort)	2	3	1	1	0	0	7
Number of Properties with Lead ≥ 5 and < 15 µg/L in the Second and/or Third Bottle⁵ (triggers additional investigation effort)	3	7	6	3	0	0	19
Number of Properties with Lead ≥ 5 and < 15 µg/L in First Bottle² (triggers customer education)	10	16	9	4	2	1	42

¹ Counts are based on the month of sample collection, consistent with the requirements of the Order. This note does not apply to the “Total Number of Letters Mailed to Offer Post-LSLR Replacement Sampling” or “Total Number of Kits Mailed Out”, which are presented based on the date the offer letter or sample kit is mailed.

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 between January 1, 2021, and June 4, 2021.

⁵ Applies to single-family residences only.

Since post-LSL replacement sampling has been offered through the LRP, 300 properties were excluded due to their tap status in the inventory (i.e., inactive or irrigation and therefore ineligible) or an error in the mailing address.²¹ This evaluation considered properties receiving offer letters by June 4, 2021, which by definition includes properties where the service line was

²⁰ See Appendix CCT-2 Post LSL Replacement Water Quality Results (First Six-Month Period of 2021).

²¹ See Appendix CCT-3 Post LSL Replacement Sampling – Summary of Incomplete Offer to Test (First Six-Month Period of 2021).

replaced in January and February of 2021. For the 300 properties, follow-up post-LSL replacement sampling offer letters will be sent to 125 properties and additional investigation will be undertaken at 83 properties to assess the logistics of offering post-LSL replacement sampling.

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.

Outreach to customers residing in all households built between 1983 and 1987 was launched in August 2020. “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.

Water quality sampling at 1983 to 1987 homes was initiated on September 8, 2020. Of the 38,477 properties contacted, 165 sample kit requests were received. Lead was measured greater than 3 µg/L in the first bottle from six properties, one of which identified as a household with a formula-fed infant and was enrolled in the Filter Program.²² An additional 77 requests for sample kits were received after the new year, in response to the initial request to select households from September 2020. Results recorded in LIMS between January 1 and June 4, 2021, are presented in Table 10.²³ Two customers returned two sampling kits, yielding a total of 79 sampling results. Lead was measured greater than 3 µg/L in the first bottle from four properties, two of which identified as a household with a formula-fed infant. Only one household requested a pitcher filter and was enrolled in the Filter Program during this reporting period, for a total of two select households enrolled in the Filter Program since the inception of the LRP.

²² See Fourth Quarter Report for 2020.

²³ See Appendix CCT-4 Summary of Water Quality Sampling Results from Select Households (1983 to 1987 Homes, First Six-Month Period of 2021).

**TABLE 9: SUMMARY OF WATER QUALITY RESULTS FROM SELECT HOUSEHOLDS
JANUARY 1 TO JUNE 4, 2021**

Water Quality Sampling at 1983 and 1987 Households (whether or not there is a formula-fed infant)	Count ¹						TOTAL
	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021	
Total Number of Kits Mailed Out	26	14	8	9	7	0	64
Total Number of Kits Received and Analyzed for Lead²	17	10	6	5	7	0	45
Total Number of Kits Received and Analyzed for Lead Not Previously Reported	34 ³	0	0	0	0	0	34
Number of Properties with Lead > 3 µg/L in Bottle 1 (triggers enrollment in the Filter Program)	2	1	0	0	1	0	4
Number of Properties Self-identified with Formula-fed Infant and Requested Enrollment in the Filter Program	1	0	0	0	0	0	1
Number of Properties with Lead > 3 µg/L for which No Request for Enrollment in the Filter Program has been Received	0	1	0	0	0	0	1
Total Number of Select Households with a Formula-fed Infant Enrolled in Filter Program, since LRP Inception	0	0	0	0	0	0	2

¹ Counts are based on the month of sample collection. This note does not apply to the “Total Number of Kits Mailed Out”, which is categorized based on the date the sample kit was mailed.

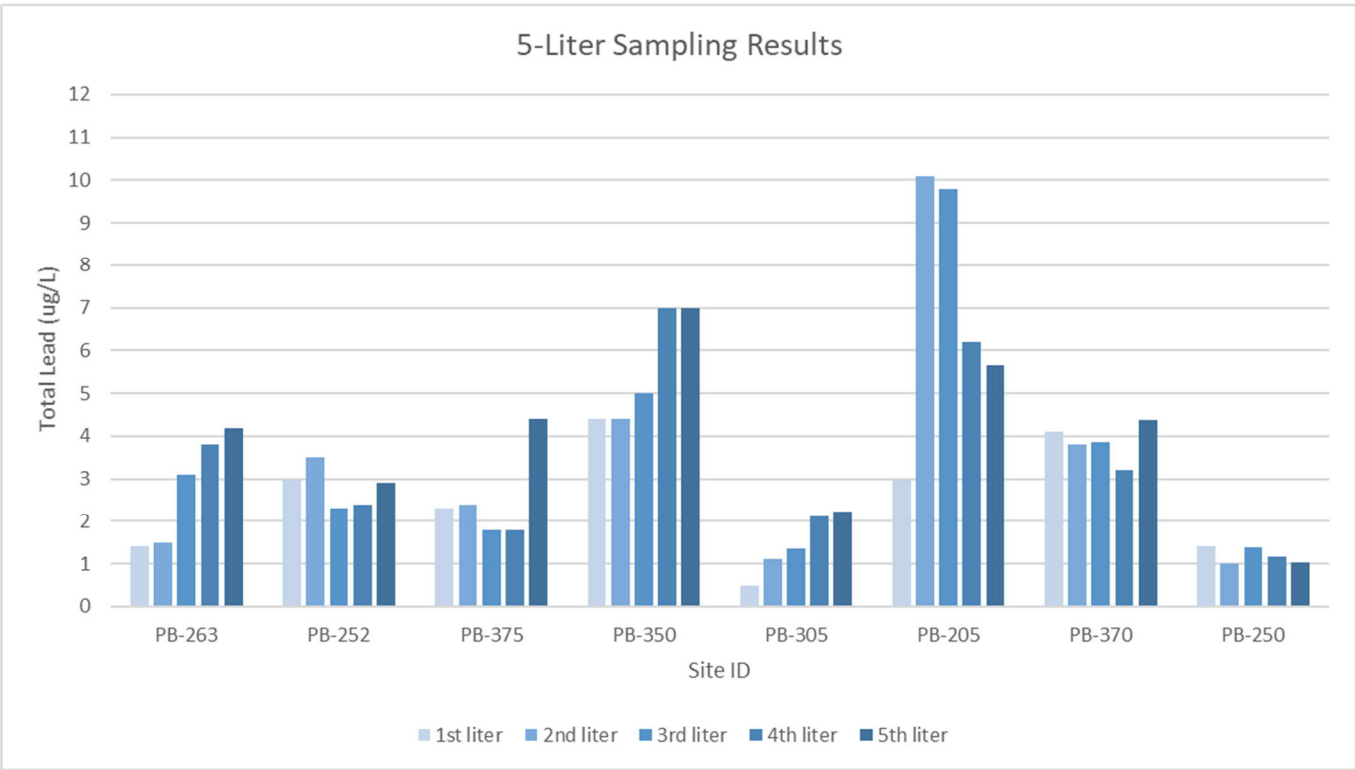
² Total number of kits analyzed refers to results available in LIMS between January 1 and June 4, 2021.

³ There are 34 kits with samples collected in 2020 that are included in this January metric for data completeness.

Voluntary 5th L Sample Collection

During the spring 2021 LCR compliance sampling, technicians collected five 1 L sequential samples at 10 random properties with a lead service line included in the LCR study pool in preparation for new sampling protocols described in the new EPA Lead and Copper Rule Revisions published in January 2021. Results are shown in Figure 2 by Site ID at eight of the 10 homes sampled; lead was measured < 1.0 µg/L in all five samples at the other two properties. The results of Figure 2 were compared to results generated from profile testing described in the Lead Reduction Program Plan, which included sampling using ten sequential samples. While the 5th L sample does not measure concentrations as far down the service line as the previous Lead Profile Study, the data below suggest 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. Lead concentrations at PB-263, 350, and 305 clearly increase as the draw number increases, but all results were less than 15 µg/L and all but one was less than 10 µg/L. All results are an early indication that the CCT component of the LRP is working and is expected to meet the needs of the LCRR.

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



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).*

An overview of the LSL Inventory reporting requirements is shown in Table 10.

TABLE 10. 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 February 5, 2020. ²⁴
3.C	Publication of LSL Inventory no later than 70 days after the effective date.	Re-posted to Denver Water website on June 30 using data through June 4, 2021.
7.B.ii.a	Total number of LSLs.	Refer to Table 11. See Appendix. ²⁵
7.B.ii.b	Total number of replaced LSLs during the Variance.	Refer to Table 12.
7.B.ii.c	Total number of known, suspected and possible LSLs.	Refer to Table 11.
7.B.ii.d	Total number of unlikely lead.	Refer to Table 11.
7.B.ii.e	Total number of non-lead service lines. Total number of non-lead determined solely by statistical methods.	Refer to Table 11. Described after Table 11.
7.B.ii.f 3.D	Number of investigations that result in a change in the status of the service line in the LSL Inventory (and that are performed independently of a LSL replacement).	Refer to Table 16.
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/you-r-water/water-quality/lead
7.B.ii.h	Rationale for change to status of the service line in the LSL Inventory.	See Appendix. ²⁶

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

The initial LSL Inventory designating known, suspected, and possible LSLs was submitted on February 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 11). 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 11 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 “known lead” service lines includes the number of

²⁴ See Appendix REG-1 Copies of Letters for Compliance-Related Submissions (First Six-Month Period of 2021).

²⁵ See Appendix INV-1 Summary of Service Line Status and p-Value (First Six-Month Period of 2021).

²⁶ See Appendices INV-2A Line by Line p-Value Changes: Status Descriptions and Notes (First Six-Month Period of 2021) and INV-2B Line by Line p-Value Changes by Status (First Six-Month Period of 2021).

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

TABLE 11. LEAD SERVICE LINE INVENTORY AS OF JUNE 4, 2021

Status of Service Line	Sept 6, 2019 Submittal (Aug 8 2019 Data)	Feb 5, 2020 Submittal (Jan 28 2020 Data)	Jan 29, 2021 Submittal (Dec 30 2020 Data)	Jul 9, 2021 Submittal (Jun 4 2021 Data)
	BASE INVENTORY ¹		2020 ANNUAL REPORT ²	CURRENT INVENTORY ³
Known Lead	1,066	1,149	7,507 ⁵	10,242 ⁵
Suspected Lead	61,374 ⁴	60,549 ⁴	54,178	51,635
Possible Lead	22,106 ⁴	21,788 ⁴	19,894	19,469
Unlikely Lead	89,388	90,745	88,475	88,260
Non-lead	145,766	146,528	150,642 ⁶	151,052 ⁶
Total Number of Services	319,700	320,759	320,696	320,658
TOTAL ESTIMATED Number of Lead Service Lines	63,955	63,195	63,211	63,599⁷

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 $0.5 \leq p\text{-value} < 0.8$. In the Base Inventory and Feb 5, 2020 Submittal, service lines with $p\text{-value} = 0.7$ 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 $p\text{-value} = 0.7$ included as “possible lead”. This does not affect the calculation used for the total estimated number of lead services.

⁵ The 2020 Annual Report 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. 7,596 properties categorized as “known lead” in the current inventory were replaced since program inception (see Tables 12 and 18). Due to ongoing data integration and QC processes, 133 of the 7,596 properties identified as replacements remain to be integrated into the LRP database to drive a $p\text{-value}$ change to 0. Of these 133, one remains as “unlikely lead”, 19 as “possible lead”, 73 as “suspected lead”, 21 as “known lead”, and 19 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 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 Tables 12 and 18).

⁷ See Appendix INV-1 Summary of Service Line Status and $p\text{-Value}$ (First Six-Month Period of 2021) for details on how this was calculated.

Of the 151,052 service lines identified as non-lead in the current inventory (see Table 11), 105,877 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.²⁷ Properties built or connected between

²⁷ This is the number which retains the original number of non-lead properties ($p\text{-value} = 0$) from the inventory in the Lead Reduction Program Plan (see Appendix III.B.2, Preliminary Identification of Lead Service Lines).

1951 and 1971 are considered “unlikely lead” based on historical records and evidence of non-lead materials.²⁸

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

The total number of lead services lines replaced between January 1 and June 4, 2021, is shown in Table 12. 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.²⁹

TABLE 12. NUMBER OF LSL REPLACEMENTS BETWEEN JANUARY 1 AND JUNE 4, 2021

Description	Count ¹
Number of LSLs Replaced in January 2021	187
Number of LSLs Replaced in February 2021	330
Number of LSLs Replaced in March 2021	631
Number of LSLs Replaced in April 2021	530
Number of LSLs Replaced in May 2021	369
Number of LSLs Replaced in June 2021	70
Total Number of LSLs Replaced in the First Six Months of 2021	2,117
Number of LSLs Replaced not Previously Reported ²	191
Total Number of LSLs Replaced since inception of LRP in January 1, 2020	7,596

¹ The number of replacements identified in the “Lead Replacement” column of Appendix INV-2B (Line by Line p-Value Changes by Status, First Six-Month Period of 2021) do not match the number of lead service line replacements shown in Table 12 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 2020 but not previously reported (240 added) and LSL replacements previously reported, but now being removed (49 removed); see Appendix LSL-1 (Addresses and Types of Replacements for Properties Not Previously Counted and Duplicates, from 2020) for details.

Investigations that Resulted in a Change to the Status of a Service Line [7.B.ii.f]

Investigations are performed at properties to improve the assumptions that were used to develop the LSL Inventory. A completed investigation at a property may include desktop evaluation of available data from Denver Water, 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 and result in a change in status to known lead or non-lead are counted toward the required 1.4% of the LSL Inventory investigated each year. Verification using investigations at properties included in the 2021 ALSLR Program, such

²⁸ See Appendix II.B.2 of the Lead Reduction Program Plan for details and assumptions.

²⁹ See paragraph 4.B of the Variance Order and the notes for the column “Actual Previous Materials” in Appendix LSL-2 Addresses and Types of Replacements (First Six-Month Period of 2021).

as potholing before replacing a LSL, do not count toward the 1.4% investigations required each year as described in the Variance Order.

A property at which the status (i.e., p-value) of a service line is changed is counted as a completed investigation 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 (see paragraph 3.D in the Variance).
- 3) The investigation results in a change in status of a service line to either a known lead ($p = 1$) or unlikely lead ($p = 0.02$) or non-lead ($p = 0$) (see paragraphs 7.B.ii.f and h in the Variance). For example, a water quality result with lead measured above $3 \mu\text{g/L}$ in the second or third sample bottle in the 3-bottle test would result in an adjustment to the p-value to 1.³⁰
- 4) An investigation that results in a status change can involve one or more methods including water quality samples, pothole, visual inspection, or other methods.

A three-point verification is used to pothole the status of a service line: from the main to water meter, from the water meter to the building, and inside the building where the service line enters. Potholing on its own is not conclusive for “non-lead” but it 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 present in any of the three points used for potholing and there can be no contradictions with the desktop records review and/or water quality sampling results. In some cases, additional verification points are obtained (i.e., a five-point verification including one interior inspection) to confirm non-lead when water quality sample results are not available. This same approach is applied to investigation properties and critical customers when water quality sample results are not available.

Verification potholing is used at properties included in the 2021 ALSLR Plan to confirm the material of the service line before replacement. “Investigative” potholing is used at properties to improve the knowledge of the inventory at properties that are not included in the 2021 ALSLR Plan. As of August 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.

³⁰ The threshold used as an indicator for a lead service line has been 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 $3 \mu\text{g/L}$ are considered lead. Samples collected prior to May 1, 2020, are assessed using the original threshold of $5 \mu\text{g/L}$.

Results from verification potholing are presented in Table 13 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 all three points used for verification (i.e., COPP-COPP-COPP is observed at two exterior potholes and one interior location), 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 13. OUTCOMES FROM VERIFICATION POTHOLING¹ AS PART OF THE 2021 ALSLR PLAN (JANUARY 1 TO JUNE 4, 2021)

Service Line Status before Potholing	Potholing Outcome ²	Update Inventory and Follow-up Action
Initial Status $p \geq 0.8$ (total 2,427)	1,583 confirmed lead (lead observed at least one of three points)	Property is confirmed for 2021 ALSLR Plan.
	285 inconclusive (copper observed at all three points)	Review historical and water quality data to confirm status.
	559 incomplete (could not pothole all three points)	Return to property or find a way to obtain third point. Or proceed with other investigation to confirm status.
Initial Status $0.5 \leq p < 0.8$ (total 518)	129 confirmed lead (lead observed in at least one of three points)	Property is confirmed for 2021 ALSLR Plan.
	157 inconclusive (copper observed at all three points)	Review historical and water quality data to confirm status.
	232 incomplete (could not pothole all 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)		2,970 ³

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. Potholing outcomes on their own do not necessarily result in a status change of a service line and additional investigative steps may be necessary.³¹

² Includes the earliest recorded date when lead or galvanized is confirmed, or the date of a subsequent investigation if the previous outcome was inconclusive or incomplete.

³ Includes 25 premises with initial p-value less than 0.5 in the February 20, 2020 Inventory (from Table 11) but were subsequently increased to greater than or equal to 0.5 and therefore eligible for potholing as part of the ALSLR Plan (2,247 + 518 + 25 = 2,970).

Denver Water investigated critical customer properties in advance of replacement: if lead was found, the property was scheduled for replacement in 2021 and therefore the investigation is considered a verification pothole. This occurred at nine properties included in Table 13, four of which have already had their LSL replaced and five of which are scheduled for replacement.

³¹ See Appendix INV-3 Results from Potholing for Verification as part of the 2021 ALSLR Program (First Six-Month Period of 2021). If neither lead nor copper is observed at a pothole verification point the outcome is treated as copper and the initial status. This applies to plastic pipe such as of PVC or PEX.

During the first six months of 2021, investigative potholing was performed at five properties not included in the 2021 ALSLR Plan.³² Of these five, three properties met the criteria for a completed investigation and two did not based on a p-value less than 0.5.³³

Results for water quality sampling at properties included in the 2020 or 2021 ALSLR Plan are presented in Table 14 (i.e., verification pre-LSL replacement sampling) and results from properties not included in the 2020 or 2021 ALSLR Plans are presented in Table 15 (i.e., investigative pre-LSL replacement sampling). As of February 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 8.5.³⁴ 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 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 results from three-point verification potholing reveal copper and no contradictions with other data sources exist (i.e., the p-value is not reduced to 0 based on water quality results alone).

TABLE 14. OUTCOMES FROM WATER QUALITY INVESTIGATIONS¹ AS PART OF THE 2021 ALSLR PLAN (JANUARY 1 TO JUNE 4, 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 1,094)	418 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.
	676 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 (or in the 2020 ALSLR Plan and not previously reported) and therefore do not count toward the required 1.4% investigations.

³² See Appendix INV-4 Results from Potholing for Investigations not part of the 2021 ALSLR Program (First Six-Month Period of 2021). Investigative potholes completed in 2020 and not previously reported affected 13 properties and these do not count toward the 1.4% required investigations. The changes to the material designation (p-value) at these 13 properties were made in 2021 and are described in Appendix INV-2B Line by Line p-Value Changes by Status (First Six-Month Period of 2021).

³³ The three properties at which potholing led to a completed investigation are shown in Table 16.

³⁴ See monthly reports and Appendix REG-1 Copies of Letters for Compliance-Related Submissions (First Six-Month Period of 2021).

TABLE 15. OUTCOMES FROM WATER QUALITY INVESTIGATIONS¹ INDEPENDENT OF THE 2021 ALSLR PLAN (JANUARY 1 TO JUNE 4, 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 998)	42 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.
	956 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 a complete investigation are met. This number also includes samples collected at properties independent of the 2020 ALSLR Plan and not previously reported; by definition these do not count toward the required 1.4% investigations for 2021.

The p-value status of 554 properties was changed to 1.0 during the first six months of 2021 from either a suspected or possible LSL to a known lead service due only to water quality. Of these, 295 properties are by definition investigations and therefore count toward the mandatory number of investigations in 2021 and are included in Table 16. The balance is from properties included in the 2021 ALSLR Plan and thus considered verification samples. This is reflected in the current inventory in Table 11. All other changes to the status of a service line that count toward the 1.4% required investigations were made using desktop methods.

TABLE 16. NUMBER OF INVESTIGATIONS COMPLETED (MEETING CRITERIA OF "INVESTIGATION") BETWEEN JANUARY 1 AND JUNE 4, 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 Investigations Completed by Investigative Potholing Alone in the First Six Months of 2021 as reported in the LRP database	3
Number of Investigations Completed by Investigative Water Quality Sampling Alone in the First Six Months of 2021 as reported in the LRP database	295
Number of Investigations Completed by Desktop Methods Alone in the First Six Months of 2021	8
Total Number of Investigations Completed in the First Six Months of 2021 (by one or more methods)	306
Number of Investigations Not Previously Reported¹	57
Total Number of Investigations Completed in 2021	303

¹ These numbers reflect results from potholing in 2019 and 2020 but were not used to update the inventory until 2021 and thus reported here. Investigative potholing results were included in the line by line p-value changes reported in 2021 (see Appendix INV-2B).

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

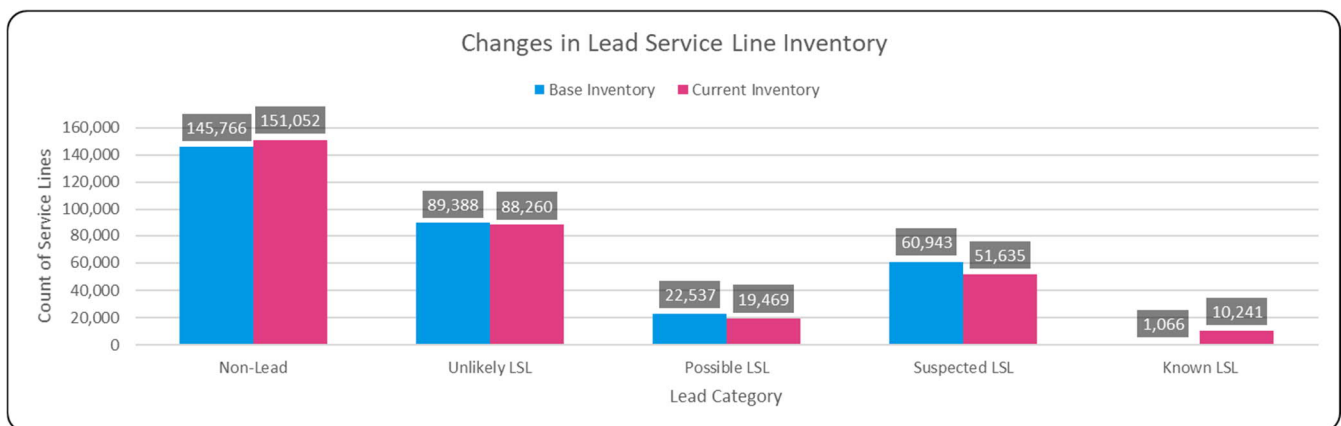
On March 5, 2020, the LSL Inventory was made publicly available on the Denver Water lead website (<https://www.denverwater.org/your-water/water-quality/lead>).

On June 30, 2021, the publicly available map was updated and reposted, incorporated the June 4, 2021, LSL Inventory. An updated inventory summary table is provided with each semi-annual report.³⁵ The website map is updated quarterly to reflect these changes to the LSL Inventory.

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

Between January 1 and June 4, 2021, updates to the LSL Inventory continued as additional data were gathered and reviewed. During this period, 3,437 changes were made to the LSL Inventory of which 3,320 were changes to the status of the service line (i.e., p-value).³⁶ This included changes based on confirmation from Denver Water, customers and distributors; review of historical data; direct evidence such as water quality and/or potholing; and replacements. In addition to material status changes, 47 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 70 properties in this reporting period.³⁷ These changes are shown in Figure 3 and are accounted for in Table 11.

**FIGURE 3. CHANGES IN THE BASE¹ AND CURRENT INVENTORY
(JANUARY 1 AND JUNE 4, 2021, USING DATA FROM COLUMNS 2 AND 5 FROM TABLE 11)**



¹ “Possible lead” as defined in the Order includes service lines with $0.5 \leq p\text{-value} < 0.8$. In the Base Inventory, February 5, 2020 Submittal of Table 12, service lines with $p\text{-value} = 0.7$ were included as “suspected lead.” For the Base Inventory shown here, 431 service lines at $p\text{-value} = 0.7$ are included under “possible lead”.

³⁵ See Appendix INV-1 Summary of Service Line Status and p-Value (First Six-Month Period of 2021).

³⁶ See Appendix INV-2B Line by Line p-Value Changes by Status (First Six-Month Period of 2021).

³⁷ See Appendix INV-2B Line by Line p-Value Changes by Status (First 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.*

Replacements under the ALSLR Program started on March 5, 2020, and results from January 1 through June 4, 2021, are described in this section. An overview of the LSL replacement requirements is shown in Table 17.

TABLE 17. 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. ³⁸
7.B.iii.b	Type of replacement.	See Table 18 and Appendix. ³⁸
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. ³⁹
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 18 and Appendix. ⁴⁰
LRPP III.D (p 57)	Replace LSL at properties with consistently high lead release and critical care customers.	Described in this section.

³⁸ See Appendix LSL-2 Addresses and Types of Replacement (First Six-Month Period of 2021).

³⁹ See Appendix LSL-3 LSL Replacement Refusal List (First Six-Month Period of 2021).

⁴⁰ See Appendix LSL-4 Properties with Emergency Repairs Resulting in a Partial Replacement (First Six-Month Period of 2021).

Paragraph Reference	Description	Refer to
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 16.
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. ⁴¹

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 Transmission and Distribution (T&D) and ALSLR contractors started LSLs replacements on January 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.⁴²

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 child care 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 child care facility added to CDPHE’s licensed child care facility dataset since 2020 was added to the 2021 ALSLR Plan. The critical customer list included 144 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, 25 properties were removed from the list upon confirmation of a non-lead service line and the lead service line was replaced at another 20 properties. At the end of this reporting period, 99 properties remain on the critical customer list.

Denver Water T&D crews address properties identified in the elevated lead response plan: individual replacements are completed within approximately two weeks at properties where lead is measured above 150 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.

⁴¹ See Second Quarter Report of 2020.

⁴² See Appendix LSL-2 Addresses and Types of Replacement (First Six-Month Period of 2021).

Protocols to manage the health and safety concerns of COVID-19 are reinforced with mask usage 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 January 1 and June 4, 2021, are summarized in Table 18. Denver Water maintains a detailed list of the type of LSL replacements completed and the associated addresses.⁴³

TABLE 18. TYPE OF LSL REPLACEMENTS (JANUARY 1 TO JUNE 4, 2021)

Type of LSL Replacement January 1 through June 4, 2021	Denver Water (Watermain, Emergency, & ALSLR) ¹	Third Party (Developer, Homeowner, & Other) ²	Total
Full Lead Replacement³	1,059	78	1,137
Partial Lead Replacement, such that no Lead Remains After Replacement⁴	801	14	815
Full Galvanized Replacement	7	0	7
Partial Galvanized, such that no Lead or Galvanized Remains After Replacement	151	7	158
TOTAL REPLACEMENTS in Reporting Period, with no Lead Remaining After Replacement	2,018	99	2,117
TOTAL REPLACEMENTS Not Previously Reported⁵	33	158	191
TOTAL REPLACEMENTS completed since LRP Inception	7,185	411	7,596
Emergency Repair, Partial Replacement (i.e., where consent was NOT granted and lead remains in the ground)	15	0	15

¹ Denver Water includes LSL replacements completed as part of water main replacements, emergency repairs, scheduled replacements, and ALSLR individual and geographic replacements completed by Denver Water or its contractors. This is consistent with previously submitted reports.

² Third party includes LSL replacements completed by developers, property owners and other government agencies as identified in Appendix LSL-2. This is consistent with previously submitted reports.

³ This category includes replacements of service lines described as lead-unknown and unknown-unknown.

⁴ This category includes replacements of service lines described as lead-copper and copper-unknown. If the three-point verification process reveals copper at all three locations, the service line is not replaced unless the p-value suggests lead (and then the replacement is counted as a full lead service line replacement).

⁵ This includes the net change to the number of LSL replacements completed in 2020 but not previously reported (240 added) and LSL replacements previously reported, but now being removed (49 removed); see Appendix LSL-1 (Addresses and Types of Replacements for Properties Not Previously Counted and Duplicates, from 2020) for details.

Adjustments were made to the cumulative total number of LSL replacements completed since the inception of the LRP for a net increase of 191 replacements. This includes replacements completed in 2020 due to tap cuts, reimbursements and third-party replacements but not verified before year end.⁴⁴ Although these do not count toward the mandatory number of replacements for 2021, they are counted toward the cumulative total. Similarly, this includes a

⁴³ See Appendix LSL-2 Addresses and Types of Replacement (First Six-Month Period of 2021).

⁴⁴ See Appendix LSL-1 Addresses and Types of Replacements for Properties Not Previously Counted and Duplicates (from 2020).

deduction for 49 properties that were previously counted as replacements but were subsequently determined to be non-lead, a duplicate record, or were part of a watermain changeover which happens when a service line is “moved” from the old watermain to the new watermain, resulting in a partial LSL replacement from the main to the meter.⁴⁵

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

Distribution of notification letters, including consent forms, was initiated on December 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.⁴⁶ 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 19. Between January 1 and June 4, 2021, a total of 162 property owners refused to participate in the ALSLR Program or were non-responsive following multiple attempts at contact. Attempts to obtain voluntary consent from a property owner are undertaken before work can start to replace the lead service line.

TABLE 19. SUMMARY OF CONSENT AND LSL REFUSAL LIST (JANUARY 1 TO JUNE 4, 2021)

Description	Consent Form Signed ¹	Customer Refused ²
Total Number of Properties for which Consent was Given or Refused in 2020 (as of December 4, 2020)³	4,753	39
Total Number of Properties for which Consent was Given or Refused during the First Six Months of 2021	2,897	176
Total Number of Properties for which Consent was Given or Refused Year-to-Date	2,897	176 ²

¹ The total number of signed consent forms represent only the ALSLR contractors. The total does not include attempts made by Denver Water T&D crews; this is tracked and will be provided in the second semi-annual report for 2021.

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-3 LSL Replacement Refusal List (First Six-Month Period of 2021).

³ As described in the Fourth Quarter Report of 2020.

A range of outreach methods is used to contact property owners.⁴⁷ 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,

⁴⁵ See Appendix LSL-1 Addresses and Types of Replacements for Properties Not Previously Counted and Duplicates (from 2020) for details regarding properties added to the count of cumulative replacements. Properties removed can be identified as “Not LSL Replacement” in the column titled “Revision”.

⁴⁶ See Appendix LSL-3 LSL Replacement Refusal List (First Six-Month Period of 2020).

⁴⁷ See Appendix COE-C.1 Strategy Denver Water LRP 2020 Communications Plan included with the First Quarter Report of 2020.

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.

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.⁴⁸ In the third quarter, an effort will be launched to send targeted materials to properties on the refusal list to facilitate follow-up with the property owner at least once a year to encourage participation.⁴⁹ Additionally, any change to the property ownership triggers additional outreach to obtain consent to replace the LSL. One change in ownership at a property on the 2020 Refusal List occurred in late April 2021 and follow up is underway to gain consent for replacement within 91 days of the change in owner.

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). 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 responding and is added to the list of “non-response” until the issue is resolved, and the lead service line can be replaced.⁵⁰

⁴⁸ See Appendix LSL-3 LSL Replacement Refusal List (First Six Months of 2021).

⁴⁹ See Appendix LSL-5 Properties Added to Refusal List in 2020 and Require Follow-up in 2021 (First Six Months of 2021).

⁵⁰ See Appendix COE-D.12 Safety or Repairs Needed Notification Letter of Second Quarter Report (2020).

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

During this reporting period, 15 partial replacements occurred as a result of emergency repair or watermain work (i.e., some lead remains in the ground). This affected a total of 28 properties since program inception in January 2020 as a result of:⁵¹

- No consent or no available contact information for the property owner and therefore consent could not be obtained at the time of the work (this affected six properties).
- No consent to perform the full replacement due to no response from the property owner (this affected five properties, two of which were not previously reported in 2020).
- Restricted access due to the interior plumbing arrangement (one property).
- Property redevelopment (one property).
- Rescheduled at a more convenient time following a late-night emergency repair (one property).
- Restricted access due to gas station logistical constraints (one property).

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

⁵¹ See Appendix LSL-4 Properties with an Emergency Service Line Repair Resulting in a Partial Replacement (First Six-Month Period of 2021).

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.*

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 replacements. Using the current LSL Inventory from Table 11, it is estimated that Filter Program participants consist of approximately 97,735 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 20.

TABLE 20. 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. ^{52,53}
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. ^{54,55}
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. ^{56,57}
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 ⁵⁸ 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. ⁵⁸
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 September 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. ^{59,60}

⁵² See Appendix FIL-1A Filter Delivery Addresses (Dec 5 to Dec 31, 2020).

⁵³ See Appendix FIL-1B Filter Delivery Addresses (First Six-Month Period of 2021).

⁵⁴ See Appendix FIL-2A Filter Program Opt-Outs (Dec 5 to Dec 31, 2020).

⁵⁵ See Appendix FIL-2B Filter Program Opt-Outs (First Six-Month Period of 2021).

⁵⁶ See Appendix FIL-3A Filter Program Refusals (Dec 5 to Dec 31, 2020).

⁵⁷ See Appendix FIL-3B Filter Program Refusals (First Six-Month Period of 2021).

⁵⁸ See Appendix FIL-4 Confirmation of Filter Performance in Field Results (First Six-Month Period of 2021).

⁵⁹ See Appendix FIL-5A Replacement Cartridge Distribution Addresses (Dec 5 to Dec 31, 2020).

⁶⁰ See Appendix FIL-5B Replacement Cartridge Distribution Addresses (First Six-Month Period of 2021).

Paragraph Reference	Description	Refer to
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. ^{61, 62} See Appendix. ^{63,64}
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 September 10, 2020. ⁶⁵
5.F.i	Confirmation of filter performance before distribution within 90 days of the effective date.	Submitted February 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.	To be reported in second semi-annual 2021
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. ⁶⁶

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

Denver Water began filter distribution on February 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 September 21, 2020.

Pitcher filter distribution continues for occupancy changes and customer requested replacements for broken or missing pitcher filters. Between December 5, 2020, and December 31, 2020, pitcher filters and a six-month supply of replacement filters were distributed to 1,026 households as a result of occupancy changes. During the first six months of 2021, pitcher filters and a six-month supply of replacement filters were distributed to 4,636 households; see Table 21

⁶¹ See Appendix FIL-6A Occupancy Changes - COE Distribution (Dec 5 to Dec 31, 2020).

⁶² See Appendix FIL-6B Occupancy Changes - COE Distribution (First Six-Month Period of 2021).

⁶³ See Appendix FIL-7A Occupancy Changes - Pitcher Filter Distribution (Dec 5 to Dec 31, 2020).

⁶⁴ See Appendix FIL-7B Occupancy Changes - Pitcher Filter Distribution (First Six-Month Period of 2021).

⁶⁵ See Third Quarter Report of 2020 (Appendix FIL-29 OMB Approved Filter Adoption Survey Questions).

⁶⁶ See Appendix FIL-8 Informal Filter Adoption Survey Results Summary (First Six-Month Period of 2021).

for pitcher filter distribution and Table 22 for a summary of distribution of post-LSL replacement filters.

TABLE 21. SUMMARY OF FILTER DISTRIBUTION (DECEMBER 5, 2020, TO JUNE 4, 2021)

Description	Count	Comment
Total Number of Households Provided with a Filter Kit between December 5 and December 31, 2020	1,026	See Appendix. ⁶⁷
Initial Pitcher Distribution for Customers Enrolled in 2021	535	See Appendix. ⁶⁸
Total Number of Households Provided with a Filter Kit between January 1 and June 4, 2021	4,101	See Appendix. ⁶⁹
Number of Households that Use their own NSF-Certified Filter or Bottled Water between December 5 and December 31, 2020	4	See Appendix. ⁷⁰
Number of Households that Use their own NSF-Certified Filter or Bottled Water between January 1 and June 4, 2021	41	See Appendix. ⁷¹
Number of Households that Declined to Use a Filter or Bottled Water between December 5 and December 31, 2020	13	See Appendix. ⁷²
Number of Households that Declined to Use a Filter or Bottled Water between January 1 and June 4, 2021	29	See Appendix. ⁷³

TABLE 22. SUMMARY OF SIX-MONTH SUPPLY POST-LSL REPLACEMENT FILTER DISTRIBUTION (DECEMBER 5, 2020, TO JUNE 4, 2021)

Description	Count	Comment
Number of Households Provided with Six-Month Supply of Filter Replacements Post Lead Service Line Replacement between December 5 and December 31, 2020^{1,2}	48	This includes emergency repairs and replacements performed by Denver Water and third parties. See Appendix. ⁷⁴
Number of Households Provided with Six-Month Supply of Filter Replacements Post Lead Service Line Replacement between January 1 and June 4, 2021^{1,2}	2,047	This includes emergency repairs and replacements performed by Denver Water and third parties. See Appendix. ⁷⁵

¹ This value may not match the number of lead service line replacements completed between December 5, 2020, and June 4, 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 18.

⁶⁷ See Appendix FIL-1A Filter Delivery Addresses (Dec 5 to Dec 31, 2020).

⁶⁸ See Appendix FIL-12 Initial Pitcher Filter Distribution After 2020 (First Six-Month Period of 2021).

⁶⁹ See Appendix FIL-1B Filter Delivery Addresses (First Six-Month Period of 2021).

⁷⁰ See Appendix FIL-2A Filter Program Opt-Outs (Dec 5 to Dec 31, 2020).

⁷¹ See Appendix FIL-2B Filter Program Opt-Outs (First Six-Month Period of 2021).

⁷² See Appendix FIL-3A Filter Program Refusals (Dec 5 to Dec 31, 2020).

⁷³ See Appendix FIL-3B Filter Program Refusals (First Six-Month Period of 2021).

⁷⁴ See Appendix FIL-9A Distribution of Post Lead Service Line Replacement Six-Month Cartridge Replacement Supply (Dec 5 to Dec 31, 2020).

⁷⁵ See Appendix FIL-9B Distribution of Post Lead Service Line Replacement Six-Month Cartridge Replacement Supply (First Six-Month Period of 2021).

New customers enrolled in the Filter Program in 2021 are included in the count for initial distribution of pitcher filters in Table 21, along with customers that were previously enrolled in the Filter Program but that failed to receive their initial pitcher filter. Together, this represents approximately 0.5% of the current 97,735 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.⁷⁶ As part of this exercise, 2,994 properties were reviewed.

An analysis of return-to-sender addresses was reported in 2020 but is not repeated in this report. In the first six-month period of 2021, return-to-sender addresses are investigated and upon reconciliation a filter kit is re-sent to the correct address or if vacant, the property is removed from the LRP.

Replacement Filter Distribution to Customers Enrolled in the Filter Program

Between December 5 and December 31, 2020, a total of 9,811 replacement filters (i.e., filter cartridges) were distributed to customers enrolled in the Filter Program in accordance with the manufacturer's recommendation for replacement within six months.⁷⁷ Between January 1 and June 4, 2021, an additional 99,976 replacement filters were distributed to customers enrolled in the Filter Program also in accordance with the manufacturer's recommendation for replacement within six months.⁷⁸ Replacement filters mailed to 1,689 properties were returned-to-sender.⁷⁹ An unsuccessful delivery prompts an investigation and upon reconciliation a replacement filter is re-sent to the correct address or if vacant, the property is removed from the LRP.

A number of customers received replacement filters after the six-month replacement period. The extended duration was the result of a mismatch of the service point identification number (SPID) in the LRP database during the development of mailing lists for the replacement

⁷⁶ See Appendix FIL-12 Initial Pitcher Filter Distribution After 2020 (First Six-Month Period of 2021).

⁷⁷ See Appendix FIL-5A Replacement Cartridge Distribution Addresses (Dec 5 to Dec 31, 2020).

⁷⁸ See Appendix FIL-5B Replacement Cartridge Distribution Addresses (First Six-Month Period of 2021).

⁷⁹ See Appendix FIL-10 Filter Program Replacement Cartridge Returns (First Six-Month Period of 2021).

cartridges. Replacement filters were mailed as soon as the mismatch was identified. In some cases, customers contacted the call center to request a replacement filter. Corrective actions have been implemented to the process used to generate the mailing lists and the call center continues to be available for customer requested replacement filters. This affected 38 properties between December 5 and December 31, 2020, and 123 properties between January 1 and June 4, 2021.^{80, 81}

Occupancy Changes

Occupancy changes that occurred were added to weekly filter distribution batches to allow new occupants to receive a pitcher filter within 35 days of new occupancy. This affected 369 occupancy changes between December 5 and December 31, 2020, and 2,562 occupancy changes between January 1 and June 4, 2021.^{82, 83} Occupancy changes are tracked daily to provide multiple mailings per week to allow new occupants to receive their LRP Introductory Letter and LRP Overview Booklet within 14 days of the change in occupancy.

Filter Distribution to Formula-fed Infants in Select Households

As described in Table 9, only one 1983 to 1987 household with a formula-fed infant requested enrollment in the Filter Program during the first six-month reporting period of 2021, i.e., a select household as identified in paragraph 5.D of the Variance.⁸⁴

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

The formal Filter Adoption Survey was approved by EPA on September 10, 2020. The survey for 2021 is scheduled to be distributed on August 2, 2021, to approximately 15,000 properties or about 15% of customers enrolled in the Filter Program.⁸⁵

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 542 participants were captured in the LRP database.^{86,87} This accounts for 12% of the total 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:

⁸⁰ See Appendix FIL-5A Replacement Cartridge Distribution Addresses (Dec 5 to Dec 31, 2020).

⁸¹ See Appendix FIL-5B Replacement Cartridge Distribution Addresses (First Six-Month Period of 2021).

⁸² See Appendix FIL-7A Occupancy Changes – Pitcher Filter Distribution (Dec 5 to Dec 31, 2020).

⁸³ See Appendix FIL-7B Occupancy Changes – Pitcher Filter Distribution (First Six-Month Period of 2021).

⁸⁴ See Appendix CCT-4 Summary of Water Quality Sampling Results from Select Households (1983 to 1987 Homes, First Six-Month Period of 2021).

⁸⁵ See Third Quarter Report of 2020 (Appendix FIL-29 OMB Approved Adoption Survey Questions).

⁸⁶ See Appendix FIL-8 Informal Filter Adoption Survey Results Summary (First Six-Month Period of 2021).

⁸⁷ See Appendix FIL-11 Informal Filter Adoption Survey Detailed Responses (First Six-Month Period of 2021).

- Of the 542 responses, the majority of customers indicated that they used filtered or bottled water for drinking (93%) and cooking (78%).
- All households with a formula-fed infant indicated that they used filtered water when preparing formula, except one.

There were no surveys of filter use as part of virtual meetings during this reporting period.

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 95 customers that have opted out since the launch of the Filter Program, 10 use bottled water as an alternative to the filter and 12 use their own filter certified NSF 53 for lead removal. For the 73 remaining customers, Denver Water was unable to confirm if the customer was using an NSF 53 certified filter.^{88,89} 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.

TABLE 23. 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	Unconfirmed Use of Own NSF 53 Certified Filter or Bottled Water
2020 (January 1 to December 4, 2020)	63	9	6	48
2020 (December 5 to December 31, 2020)	4	0	2	2
2021 (January 1 to June 4, 2021)	41	5	4	32
Total Removed from LRP due to Non-Lead Designation or LSL Replacement	13	2	2	9
Total Since LRP Inception	95	12	10	73

⁸⁸ See Appendix FIL-2A Filter Program Opt-Outs (Dec 5 to Dec 31, 2020).

⁸⁹ See Appendix FIL-2B Filter Program Opt-Outs (First Six-Month Period of 2021).

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

From December 5 to December 31, 2020, and January 1, 2021, to June 4, 2021, respectively, notice of refusal to participate in the Filter Program was received for 13 and 29 properties.^{90,91} 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 65 since the inception of the LRP.

TABLE 24. SUMMARY OF FILTER REFUSAL LIST

Reporting Period	Number of Properties Refusing to Participate
2020 (January 1 to December 4, 2020)	30
2020 (December 5 to December 31, 2020)	13
2021 (January 1 to June 4, 2021)	29
Total Removed from LRP due to Non-Lead Designation or LSL Replacement	7
Total Since LRP Inception	65

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.^{92,93}
- List of six-month supply of replacement filters provided after lead service line replacement.^{94,95}
- List of premise addresses and service point IDs for all households that refuse to participate in the Filter Program.^{90,91}
- List of premise addresses that have returned replacement cartridges to sender.⁹⁶
- 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.⁹⁷

⁹⁰ See Appendix FIL-3A Filter Program Refusals (Dec 5 to Dec 31, 2020).

⁹¹ See Appendix FIL-3B Filter Program Refusals (First Six-Month Period of 2021).

⁹² See Appendix FIL-1A Filter Delivery Addresses (Dec 5 to Dec 31, 2020).

⁹³ See Appendix FIL-1B Filter Delivery Addresses (First Six-Month Period of 2021).

⁹⁴ See Appendix FIL-9A Distribution of Post Lead Service Line Replacement Six-Month Cartridge Replacement Supply (Dec 5 to Dec 31, 2020).

⁹⁵ See Appendix FIL-9B Distribution of Post Lead Service Line Replacement Six-Month Cartridge Replacement Supply (First Six-Month Period of 2021).

⁹⁶ See Appendix FIL-10 Filter Program Replacement Cartridge Returns (First Six-Month Period of 2021).

⁹⁷ See Appendix FIL-8 Informal Filter Adoption Survey Results Summary (First Six-Month Period of 2021).

- Detailed responses from the informal filter use field survey responses collected as part of lead service line replacement activities.⁹⁸
- Confirmation of pitcher filter performance in the field.⁹⁹
- List of premise addresses and service point identification numbers for all households that opt-out of the Filter Program and for whom it has been certified that the household is using their own filter (NSF-certified to remove lead) or bottled water.^{100,101}
- Replacement filter distribution.^{102,103}
- Occupancy changes for pitcher filter distribution.^{104,105}
- Occupancy changes for filter education information – LRP Introductory Letter and LRP Overview Booklet.^{106,107}
- Initial Filter Distribution after 2020¹⁰⁸

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 first six-month compliance period of 2021 are included in this reporting period (see Figure 4). Samples were collected from 54 properties between March 17 and May 25, 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.

⁹⁸ See Appendix FIL-11 Informal Filter Adoption Survey Detailed Responses (First Six-Month Period of 2021).

⁹⁹ See Appendix FIL-4 Confirmation of Filter Performance in Field Results (First Six-Month Period of 2021).

¹⁰⁰ See Appendix FIL-2A Filter Program Opt-Outs (Dec 5 to Dec 31, 2020).

¹⁰¹ See Appendix FIL-2B Filter Program Opt-Outs (First Six-Month Period of 2021).

¹⁰² See Appendix FIL-5A Replacement Cartridge Distribution Addresses (Dec 5 to Dec 31, 2020).

¹⁰³ See Appendix FIL-5B Replacement Cartridge Distribution Addresses (First Six-Month Period of 2021).

¹⁰⁴ See Appendix FIL-7A Occupancy Changes - Pitcher Filter Distribution (Dec 5 to Dec 31, 2020).

¹⁰⁵ See Appendix FIL-7B Occupancy Changes - Pitcher Filter Distribution (First Six-Month Period of 2021).

¹⁰⁶ See Appendix FIL-6A Occupancy Changes - COE Distribution (Dec 5 to Dec 31, 2020).

¹⁰⁷ See Appendix FIL-6B Occupancy Changes - COE Distribution (First Six-Month Period of 2021).

¹⁰⁸ See Appendix FIL-12 Initial Pitcher Filter Distribution After 2020 (First Six-Month Period of 2021).

Lead was measured below the detection limit in filtered water at 48 of the 55 properties and below 2 µg/L at all properties with one exception.¹⁰⁹ Using the testing criteria of NSF 53, 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 affected property was immediately provided with a new filter pitcher and cartridge and the customer communicated that the filter pitcher was not routinely used at the property. Lead in the unfiltered tap water was measured less than 2 µg/L in two samples collected on the same day the filter effluent sample was collected. 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.¹¹⁰

[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. Seven 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.¹¹¹

¹⁰⁹ See Appendix FIL-4 Confirmation of Filter Performance in Field Results (First Six-Month Period of 2021).

¹¹⁰ When lead is measured above 15 µg/L in the first draw sample, the property is scheduled for LSL replacement within two months.

¹¹¹ See Appendix FIL-4 Confirmation of Filter Performance in Field Results (First Six-Month Period of 2021).

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.*

A summary of the performance metrics that will ultimately be used to evaluate the overall performance of the LRP is presented in Table 25.

TABLE 25. SUMMARY OF COMPLIANCE

Paragraph	Description	Comment
2.C	<p>C. Corrosion Control Treatment Metric. Denver Water must consistently <u>maintain in all parts of the System a minimum target pH of 8.5 during the first year of operation under this Variance.</u></p> <p>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.</p>	See Section 7.B.i
3.D	<p>D. LSL Inventory Compliance Metric. Denver Water <u>must investigate a minimum of 1.4% of the total estimated number of suspected and possible LSLs</u> in the LSL Inventory each Program Year (based on a subset of Y as described in paragraph 3.A above), as adjusted.</p> <p>These investigations are performed independently of the LSL replacements.</p>	See Section 7.B.ii
4.I	<p>I. Accelerated LSL Replacement Compliance Metric. Denver Water <u>must annually achieve at least a 7.0% cumulative average Program Year LSL replacement rate</u> as determined based on reporting required in paragraph 7.B.</p>	See Section 7.B.iii
5.G	<p>G. Filter Communication Compliance Metric. Denver Water <u>must make direct contact with lead outreach and education materials to 95% of all customers enrolled in the Filter Program</u> 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.</p>	See Section 7.B.vi
6.B	<p>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 <u>combined actual performance of the LRPP as implemented continues to be "at least as efficient as" orthophosphate treatment in reducing lead exposure</u> on an annual basis. Denver Water may account for the CCT optimization period in this demonstration.</p>	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.*

During the first 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 virtual community meeting on construction preparedness, convening the Stakeholder Advisory Committee and developing new customer resources on filter use, flushing, service line material investigation and construction. COE efforts specific to each LRP element are also included in those element sections of this report.

TABLE 26. OVERVIEW OF 7.B.VI REQUIREMENTS

Paragraph	Description	Comment
7.B.vi	2020 COE Plan 2021 COE Plan	See First Quarter Report of 2020. See Fourth Quarter Report of 2020.
7.B.vi.a	Description of COE activities conducted. Copy of materials.	Discussed in this section. See Appendices for copies of materials included. ¹¹²
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. ¹¹³
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.

¹¹² See Appendices COE-1 to 6, COE-9 and COE-12 for a copy of materials.

¹¹³ See Appendix FIL-11 Informal Filter Adoption Survey Detailed Responses (First Six-Month Period of 2021).

Outcomes of COE Activities between January 1 and June 4, 2021 (unless otherwise noted) [7.B.vi.a]

- Denver Water hosted a bilingual, one-hour virtual community meeting on February 9, 2021, focused on construction preparedness for customers slated to receive lead service line replacements in 2021. To promote the meeting, 3,034 outbound calls were made to customers slated for lead service line replacement in 2021, with 2,469 bilingual voicemail messages left for those who did not answer. 879 customers participated in this meeting.
- Denver Water received requests for presentations on the LRP from 10 local, state and national organizations and held these presentations at various times during this reporting period.
- The Stakeholder Advisory Committee met for two quarterly meetings on January 14 and April 22.
- Contact was made on 12 occasions with Denver City Council and Mayor's Office and officials in suburban jurisdictions to share program information and updates on the LRP.
- Denver Water and one of its community partners, CREA Results, participated in a White House roundtable with EPA Administrator Michael Regan focused on water infrastructure and lead removal.
- The LRP website has received 179,299 visits and 327,376 page views since the launch of comprehensive LRP information on March 5, 2020.¹¹⁴
- LRP TAP stories published on denverwater.org/TAP received 2,389 views.¹¹⁵
- Denver Water social media activity reached 505,058 individuals.
- The LRP was mentioned in 31 news media stories, with a potential aggregate readership of 235 million across online news, blogs and television.¹¹⁶

The following section highlights COE program activities carried out in 2021 through June 4, organized by strategy type.

Public Outreach

Overview of public outreach activity grouped by program component:

¹¹⁴ See Appendix COE-14 Website Traffic.

¹¹⁵ See Appendix COE-12 TAP Stories Published.

¹¹⁶ See Appendix COE-10 Earned Media Report.

- Virtual Meetings
 - Denver Water hosted a construction preparedness virtual community meeting on February 9, 2021, for all customers slated to have their lead service lines replaced in 2021.
 - The meeting was an opportunity to inform customers about what to expect before, during and after the lead service line replacement process. Emphasis was also given on proper filter use and the importance of flushing following replacement.
 - To promote the meeting, 3,034 outbound calls were made to customers included in the 2021 ALSLR Plan. As part of these outbound calls, voicemails were left with those who did not answer (totaling 2,469 customers). 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. Approximately 879 customers participated.
 - 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:
 - Registered Neighborhood Organization (RNO) - Driving Park (February 17)
 - Denver Metro Chamber of Commerce – Health & Wellness Committee (March 5)
 - Rocky Mountain Early Childhood Conference (March 25)
 - Head Start & Office of Children’s Affairs (April 8)
 - WaterNow Alliance – Accelerating LSL Removal Programs (April 8)
 - Denver’s Early Childhood Council and Denver Water – Protecting your Families and Children – English session (April 21)
 - Denver’s Early Childhood Council and Denver Water – Protecting your Families and Children – Spanish session (April 28)
 - Road to Reading Summit – comprised of early childhood community partners and organized by Denver Public Schools, Office of Children’s Affairs and Mile High United Way (May 12)
 - Children’s Environmental Health Network – Town Hall Series #3 on Lead Service Lines and the Lead and Copper Rule Revisions (May 18)
 - River Network’s Annual River Rally – Integrating Health Equity into Lead Service Line Replacement Programs (May 18)

- Stakeholder Advisory Committee
 - The Stakeholder Advisory Committee met for a 2021 kick-off meeting on January 14, 2021, and for its second quarterly meeting on April 22, 2021.
 - Representatives reflected a diverse group of organizations, including health care, education, nonprofit and government.
 - At the 2021 kick-off meeting, Denver Water provided an overview of progress made on the LRP in 2020, lessons learned in 2020 and resulting program modifications. The meeting also included a discussion centered on ways to encourage post-lead service line replacement flushing.
 - At the second quarterly meeting on April 22, 2021, Denver Water provided an update on LRP progress in 2021, a detailed review of the 2020 filter adoption survey results and hosted two group discussions. The first group discussion centered around engaging renters and landlords, the second focused on how to increase water quality sampling kit returns from customers. Prior to the meeting, Stakeholder Advisory Committee members were sent the 3-bottle water quality sampling kit so they could gain firsthand experience of receiving a kit and collecting samples.

- Government Relations
 - Twelve proactive contacts were made with local government officials and staff, including Denver City Council and Mayor’s Office and officials in suburban jurisdictions to share program information and updates for the LRP.
 - These contacts included quarterly meetings with Mayor Hancock and staff, construction updates to City Council offices and briefings to public information officers regarding the updated filter pitcher model from the manufacturer providing filters for the LRP.
 - Denver Water CEO Jim Lochhead and CREA Results Founder Fernando Pineda-Reyes were invited by the White House to participate in a roundtable with EPA Administrator Michael Regan on water infrastructure and lead removal on April 5, 2021. Mr. Lochhead spoke about the importance of equitable community engagement and the job opportunities that the Lead Reduction Program has created in Denver.

- Distributor Communications
 - Distributor forum meetings were held on January 19, February 16, April 20 and May 18 to provide updates on the LRP.
 - Updates on the LRP were published in the January and April distributor newsletters.

- Collaboration and cooperation continue with three distributors (City of Edgewater, City of Lakewood and Bancroft-Clover Water & Sanitation District) to incorporate LSL replacements as part of their capital projects, including providing material templates to support communication with customers.
- Distribution of water quality sampling kits 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.
- Paid Media
 - A paid media strategy was launched to promote the LRP in affluent areas within the City and County of Denver where residents may be not using filtered water as commonly as other areas, per the filter adoption survey results.
 - The campaign ran from April 26 through May 16.¹¹⁷
 - 3,113,441 total impressions were generated through digital media.
 - Posters were circulated in targeted community newspapers and magazines with a combined circulation of 114,000.
- Earned Media
 - The LRP was covered in digital, print and broadcast news, including ABC7 Denver, FOX31 Denver, Chicago Tribune, Indianapolis Business and MSN Online.¹¹⁸
 - There were 80 posts about the LRP on social media channels in this reporting period, resulting in 505,058 impressions. Ambassador Program partners also shared Denver Water social media posts on their own networks.
- Digital Communications
 - Denver Water distributed emails on January 19, March 24 and May 24, 2021, to a growing database of 9,477 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 for the LRP. Emails promoted engagement opportunities, encouraged proper filter use and the completion and return of water quality sampling kits.¹¹⁹

¹¹⁷ See Appendix COE-11 Paid Digital Media Campaign Report.

¹¹⁸ See Appendix COE-10 Earned Media Report.

¹¹⁹ See Appendix COE-9 January, March and May Subscriber Emails.

- Seven TAP stories were published on denverwaterTAP.org which included content related to the LRP. Two of these stories were published in Spanish. As of June 4, these stories received a total of 2,389 views.¹²⁰
- Two videos were published demonstrating proper flushing before and after lead service line replacement.¹²¹
- The LRP website, denverwater.org/Lead, was updated with the recordings of the construction preparedness virtual community meeting, comprehensive construction FAQs, program dashboards and updated lead service line inventory. Since the launch of the program, the LRP website has received 179,299 visits and 327,376 page views.¹²²
- To support the return of water quality sampling kits, Denver Water updated the program website with a new page, denverwater.org/ServiceLines, dedicated to helping customers understand the lead service line material investigation process, including the role of water quality sampling.

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

The following materials were developed through June 4, 2021:

- The public-facing dashboard was updated to share progress and key metrics for the LRP through May 31, 2021.¹²³ The updated dashboard is posted monthly to denverwater.org/Lead and is available in both English and Spanish.
- Information on the program was included in the January, March, April and June issues of WaterNews, the monthly insert included with the bills of more than 180,000 customers. The information described the 2020 accomplishments of the LRP, results of the 2020 filter adoption survey, filter usage reminders and tips, and encouraging customers to return water quality samples.¹²⁴
- ALSLR Outreach
 - A good neighbor mailing was developed to provide advance notice of construction activities to both LRP customers and surrounding neighbors who would be impacted. The mailing is sent to work areas following distribution of consent form packets to LRP customers.¹²⁵

¹²⁰ See Appendix COE-12 TAP Stories Published.

¹²¹ See Appendix COE-13 Videos Published.

¹²² See Appendix COE-14 Website Traffic.

¹²³ See Figure 1.

¹²⁴ See Appendix COE-1 January, March, April and June Issues of WaterNews.

¹²⁵ See Appendix COE-2 Good Neighbor Mailing.

- A consent form return reminder email was also developed to support additional attempts to gain consent from property owners beyond the minimum required two mailings and door knocking.¹²⁶
- Filter Program
 - A returned filter letter was developed and sent to 523 customers whose filter kit delivery status remains unconfirmed and where Denver Water was not previously able to successfully contact the resident and/or property owner via phone and/or email.¹²⁷
 - 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.¹²⁸
- Water Quality Sampling
 - A water quality sampling postcard was developed and sent to encourage the return of water quality sampling kits to help identify the material of the service line and inform the program's inventory.¹²⁹
 - A robocall script was developed to follow up with customers with pre-LSL replacement water quality results between 10 and 25 µg/L to remind them of the importance of using filtered water.¹³⁰

Internal Communications and Coordination

The following summarizes efforts to continue to educate its 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 program accessible by all.

- Trainings
 - Internal trainings and information-sharing sessions were held to update Denver Water teams and departments on the LRP and prepare them for handling customer or community inquiries as appropriate. This included 14 department roadshow presentations and the development of an internal LRP presentation team and corresponding training to prepare appropriate staff to support external and internal presentations.

¹²⁶ See Appendix COE-3 Consent Form Reminder Email.

¹²⁷ See Appendix COE-4 Returned Filter Letter.

¹²⁸ See Appendix COE-5 Filter Cartridge Replacement Package Insert.

¹²⁹ See Appendix COE-6 Water Quality Test Postcard.

¹³⁰ See Appendix COE-7 Robocall Script.

- A refresher training for ALSLR contractors was held on February 5, 2021, to remind contractors of the key elements of the LRP that support a positive customer experience and help them to properly respond to customer inquiries in the field.
- A bilingual community partner refresher training was held on March 18, 2021, to review progress and core elements of the program and support responding to customer inquiries.
- Talking points continue to be developed and updated for Customer Care and other customer-facing groups to support consistent and timely responses to customer inquiries.

Above and Beyond Stories

- In spring 2021, crews worked closely with an elderly customer and her adult son to facilitate the investigation and potential replacement of the mother's service line, which was dependent on the replacement of the service line of the adjacent property where work was unable to proceed due to lack of property owner consent. Working closely with the son who translated in Spanish for his mother, crews were able to confirm that the service line was copper inside the mother's home and between the two structures. Although the line did not need to be replaced, the crews separated the water service lines of the two adjoined properties. Now the mother's home has its own service line and meter, and no longer needs to be connected to the adjacent property which is suspected to have a lead service line.
- In spring 2021, crews were notified that as a result of a death in the family, a customer would not be available for their property's service line replacement for some time. The team coordinated with the family to work around scheduling and logistical constraints to identify a later date sometime in the following months to return to perform the replacement.
- In May, the team received the following comment from a customer who recently had a lead service line replacement:

"...we recently had our line replaced through the lead reduction project. As the project is ongoing through the neighborhood, there is a storage unit in front of our house and the crew is there at the end of the day loading up. They are SO KIND to my toddler who is VERY interested in everything they are doing. I make sure to thank them every day, but I wanted to make sure that thank you made it up the chain. They've given stickers, cookies, explained truck stuff, and are super engaging. They are a bright spot in our day, and I hope my kiddo is the same for them... Yay to your crews...!"

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.*

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 27.

TABLE 27. 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 First Quarter Report of 2020. See LRPP (p 77).
7.B.vii.a	Description of how HE&EJ principles were incorporated into the implementation of the: <ul style="list-style-type: none"> • 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.	See Appendix. ¹³¹
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.

¹³¹ See Appendix HEJ-1 Summary of Sociodemographic Indicators from 2020 Formal Filter Adoption Survey.

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 Second Semi-Annual Report for 2021.
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 program components of the LRP during the first half of 2021, as follows.

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

[Ambassador Program](#)

Denver Water continues to partner with community organizations that specialize in bridging the language and cultural gaps that may prevent the full participation of non-English, non-Spanish and other minority groups enrolled in the Lead Reduction Program. As part of the Ambassador Program, two community partners have been conducting outreach in hard-to-reach communities including:

- iNOW, 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
- CREA Results, 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 first six months of 2021, iNOW engaged in the following work:

- Provided LRP information and support to enrolled LRP customers in five languages through the virtual help desk.
- Hand-delivered water pitchers and filters to enrolled customers who were non-English and non-Spanish speakers.
- Gathered insights on filter use from three non-English and non-Spanish speaking community members.
- Reached out to and successfully recruited 77 organizations and businesses to display and/or distribute LRP materials. In addition, the Colorado Alliance for Refugee Empowerment and Success (CARES) listserv was used to promote the LRP to about 1,200 subscribers who assist refugee communities in Colorado.
- Employed community navigators' personal Facebook pages to post program information, reaching over 5,870 individuals. Of those, about 790 had some form of engagement with the social media post (such as shares, likes, comments and clicks).
- Produced and posted the following videos on iNOW's Facebook and Vimeo accounts in six languages, including those listed above as well as Spanish:¹³²
 - "How to Use a Filter to Reduce the Risk of Lead in Water" from October 2020 to June 2021.
 - "Contact the Ambassadors" in January 2021.
 - "Cooking with Filtered Water" in February 2021.
- The videos reached 4,899 people on Facebook and were viewed by 513 people on Vimeo.

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

- A Nepali restaurant owner watched a video from iNOW explaining the purpose and use of water pitchers and filters in Nepali. The restaurant received the filter box and opened it after the owner spoke with an iNOW navigator about the importance of filtering their water. The owner has instructed his staff to continue to use the water pitcher and filter.

¹³² See Appendix HEJ-2 iNOW Videos.

During the first six months of 2021, CREA Results engaged in the following work:

- Reached out to and successfully recruited 59 organizations and businesses to display and/or distribute LRP materials with an estimated reach of 4,000 people.
- Participated in 10 in-person or virtual events to educate residents within six targeted neighborhoods about the LRP with an estimated reach of 750 people.
- Met with 38 neighbors at homes enrolled in the LRP in Globeville, Elyria-Swansea, Park Hill and Barnum.
- Hosted four community workshops with a combined attendance of 40 people.
- Gathered insights on filter use from 25 non-English and non-Spanish speaking community members.
- Produced three radio shows featuring the LRP on KNRV 1150am, a Spanish language radio show, with an estimated reach of 100,000 people per show.
- Produced eight radio public service announcements to promote the LRP.
- Worked with El Comercio de Colorado, a Spanish language magazine, to publish seven articles featuring the LRP. The publication has a distribution of 25,000 biweekly for print and digital versions combined.¹³³
- Worked with El Pueblo Catolico, also a Spanish language magazine, to publish two articles featuring the LRP. The publication has a distribution of 15,000.¹³³
- Made 44 media posts or reposts on CREA’s Facebook page of Denver Water social media messaging about the LRP with a reach of 5,288.
- Produced and posted the following videos on CREA Results’ Vimeo account in June 2021:¹³⁴
 - “Tips and Tricks”
 - “Dangers of Lead”
 - “LRP Five Components”

¹³³ See Appendix HEJ-4 Ambassador Partner Spanish Language Articles.

¹³⁴ See Appendix HEJ-3 CREA Results Videos.

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

- While canvassing in the Elyria-Swansea neighborhood CREA navigators visited the home of an elderly man who spoke through his screen door. He confirmed that he received a water pitcher and filter from Denver Water, but he was not using it because he buys filtered water for drinking. When asked if he uses filtered water for cooking, he said no. CREA navigators explained the importance of using filtered water for cooking. The man opened his door and asked CREA navigators (wearing their masks) to come in and set-up his water pitcher and filter so he could begin to use it.

Sponsorship Awards Program

In early 2021, Denver Water held several strategic conversations about how to best assess and prioritize sponsorships that could highlight LRP outreach efforts, build upon the LRP paid media strategy, complement community partner activities and establish a presence in priority neighborhoods that do not have an assigned community partner.

The Sponsorship Awards Program was created to direct sponsorship funds to faith-based organizations, neighborhood businesses, community groups and other organizations with a wide reach to either leverage their existing programs/services/events or create new opportunities to build awareness about the LRP. Several organizations were identified and invited to participate in this pilot program with a focus on African Americans and Spanish speakers.

Launch of the Sponsorship Awards Program with onboarded organizations is being planned for the second half of 2021 and will track and monitor partner activities. Once the pilot program has been completed, Denver Water will evaluate if this approach should transition into an ongoing strategy to reach more people, in more places through the language and culture most appropriate for meaningful community engagement.

Critical Customer Outreach

A combination of outreach efforts including mailing, email and door knocking was conducted in the first half of 2021 to complete more lead service line replacements at critical customer facilities. 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.

Virtual Community Meetings

Spanish interpretation has been available for every virtual community meeting conducted through 2020 and 2021, including the construction preparedness meeting in February 2021. The meeting was fully bilingual, from the initial meeting promotion to the meeting presentation, poll questions and Q&A responses. The meeting recording is also available in both Spanish and English at denverwater.org/Lead. A Spanish-only meeting on the program is planned for the second half of 2021.

Materials

All customer-facing materials produced in 2021 were translated into Spanish. The construction preparedness virtual community meeting presentation, promotional materials and follow-up communications were provided in both Spanish and English. Monthly program dashboards 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 an initial letter sent in 2020, a second letter was distributed to larger apartment complexes to make them aware of this opportunity to work with Denver Water to make the program accessible for tenants.

Early Childhood

Denver Water sponsored and presented at the Rocky Mountain Early Childhood Conference in spring 2021. The session was geared toward child care providers and the presentation focused on the LRP, the history of lead in drinking water and protecting families and children from the risk of lead exposure. Polling during the session indicated that attendees from across the region had some awareness of the LRP or were learning about it for the first time and knew some information about health and safety concerns around lead but would be gaining additional knowledge from this session. Forty-nine attendees participated.

Denver Water presented at the Road to Reading Summit, which is organized by Denver Public Schools, the Office of Children's Affairs and Mile High United Way, in spring 2021. The presentation was geared towards early childhood providers to share an overview of the LRP and how to protect families and children from the risk of lead exposure. Thirty-one attendees participated in the session.

In consultation and collaboration with Denver's Early Childhood Council, two virtual trainings were conducted, one in English (with 28 attendees) and one in Spanish, for child care providers to educate them on the LRP and how to participate in and support the LRP at their facilities. Polling during the sessions indicated that attendees knew some about the health and safety concerns around lead but weren't as clear on appropriate action steps to take and would be gaining additional knowledge as part of the training. Two additional trainings, one in English and one in Spanish, will be offered again later in 2021.

Nearly 600 bags of promotional LRP material specifically designed to target families and caregivers were created and distributed in April and May with the assistance of Denver’s Early Childhood Council.

An infant formula reminder card was sent to the 102 filter adoption survey respondents who had reported that they have a formula-fed infant to emphasize the importance of using filtered water to prepare infant formula.¹³⁵

HE&EJ Principles Applied to ALSLR Program

To apply the HE&EJ principles to the LRP, a prioritization model is used to target specific neighborhoods, cohorts and underserved communities in the ALSLR Program planning and activities.

The LRP prioritization model relies on several datasets, including the state’s Women, Infants and Children (WIC) dataset and census tracts to identify neighborhoods for prioritization of LSL replacements. A risk-based approach is used with long-term construction activity planning to account for the potential for health consequences, sociodemographic indicators, and logistical constraints or opportunities related to construction.

The prioritization model is used to consider the entire lead service line inventory with scheduled construction projects for the course of the program. 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.

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. This analysis is completed annually to guide the planning of LSL replacements, the results of which are presented in the 2021 ALSLR Plan.

Following the process used in 2020 to select work areas, the ALSLR Plan for 2021 was informed by the prioritization model developed as part of the LRP and used the June 30, 2020, inventory as its basis. The 2021 prioritization model removed the weighting for critical customers (defined as schools, child care facilities, and after-school programs) as any outstanding critical customers are addressed independently of the work orders and were therefore not considered a factor in 2021 planning. However, new critical customers continue to be addressed via individual replacements as part of the elevated lead response plan. The sociodemographic data factors used in the model include an area-based distribution of household income, minority status, and WIC participation, while the potential for health consequences factors include blood lead levels (BLL), relative prevalence of expecting families and age (i.e., children).

¹³⁵ See Appendix HEJ-5 Infant Formula Reminder Card.

Once the 2021 work areas were identified from the prioritization model, the 2021 ALSLR Plan was reviewed with stakeholders, including within Denver Water and outside of Denver Water, such as CDPHE. Prior to the start of customer communications, the work areas were communicated to elected officials, the Stakeholder Advisory Committee and other key external stakeholders for information.

To leverage 2020 efforts for community outreach and education and complete replacements in existing neighborhoods, the neighborhoods prioritized in 2020 were expanded for the 2021 ALSLR Plan if the area aligned with the prioritization model. As a result, the LRP focused on continuing replacements in 2021 in five communities from the 2020 ALSLR Plan: Elyria-Swansea, Whitter, Congress Park, East Colfax and Baker. It is important to note that, based on logistical and construction constraints, properties from some neighborhoods included in 2020 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 carryover properties will increase over time based on constraint such as paving moratoriums, future paving commitments, or a delayed return of consent forms.

Three 2020 neighborhoods, Washington Park West, City Park and Clayton, were not included in geographic replacements in the 2021 ALSLR Plan but have properties included in the rollover plan. Approximately 200 properties for which consent for replacement was obtained are included as rollover properties in the 2021 task orders. However, properties included in the three areas that did provide consent in 2020 will be deferred to future planning. This is because the prioritization model revealed that other neighborhoods posed a higher risk for lead exposure. The remaining properties with a lead service line in the Washington Park West and Clayton neighborhoods will continue to be monitored in the prioritization model in future years as the model is updated to reflect the general progress of the LRP.

In addition to the continuation of work in select 2020 neighborhoods, three new neighborhoods were included in the 2021 ALSLR Plan. The Barnum, Barnum West and Park Hill neighborhoods were identified as high priority in the 2021 prioritization model and had few logistical constructability constraints. Therefore, one work area in each of Barnum and Barnum West and two work areas in Park Hill were identified for replacements in the 2021 ALSLR Plan.¹³⁶

HE&EJ Principles Applied to Filter Program

All customers enrolled in the Filter Program received their initial filter kit in 2020 with enough replacement filters to last approximately six months and the distribution of additional replacement filters began on August 27, 2020, an approximate five-month cycle following the same schedule used for the initial filter distribution. This distribution continues 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 continues in 2021 as described earlier in this section.

¹³⁶ See Appendix HEJ-6 2021 ALSLR Prioritization.

The results of the 2020 filter adoption survey were analyzed to identify sociodemographic factors that may correlate to lower or higher filter adoption.¹³⁷ Strategies and efforts to target those communities with lower adoption rates and address key themes from the survey are described elsewhere in this section and in the COE section of this report.

¹³⁷ See Appendix HEJ-1 Summary of Sociodemographic Indicators from 2020 Formal Filter Adoption Survey.

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), 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 Lead Reduction Program to improve outcomes.
- Establish an Advisory Committee to inform Denver Water on more efficient and effective ways to implement the Lead Reduction Program to achieve the Variance goals.

This means that Denver Water incorporates the Learning by Doing approach to improve outcomes during the life of the Lead Reduction Program. During the first 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 a supplement to the annual report.

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

- In the first Stakeholder Advisory Committee meeting of 2021, the committee gave feedback on instructions provided to customers to describe post-LSL replacement flushing. Customers are instructed to remove the aerator from the faucet before flushing and it was noted by the Stakeholder Advisory Committee that in some cases, a special key or tool is needed. In response, updates were made to the video on flushing to include reference to and imagery of keys or tools that may be needed.
- As customers returned pre-LSL replacement water quality samples in early 2021, a more frequent review of water quality results was deemed valuable to maintain up-to-date designations for the material of the service line. More frequent updates to the inventory supports timely and efficient field activities and task order management. As a result, the team moved from quarterly review of water quality results to weekly review.

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