



D DENVER WATER
LEAD REDUCTION PROGRAM

2023
YEAR IN
REVIEW

OVERVIEW

Denver Water is committed to delivering safe water to our customers. The water Denver Water provides to homes and businesses is lead-free, but lead can get into the water as it moves through lead-containing household fixtures, plumbing and water service lines — the pipe that brings water from the water main in the street into the home — that are owned by the customer.

In 2012, Denver Water exceeded the action level measuring the amount of allowable lead present in a customer's kitchen tap prescribed as part of the federal Lead and Copper Rule. After years of public education and study, in 2018, the Colorado Department of Public Health and Environment mandated a specific treatment method that included an additive to the drinking water supply (orthophosphate) as the best method to prevent corrosion and thus reduce the risk of lead exposure in drinking water. Denver Water and many other stakeholders came together to discuss alternatives to orthophosphate that would reduce the risk of exposure to lead while avoiding downstream impacts that would affect natural streams, rivers and wastewater treatment plants. These stakeholders proposed a more holistic approach to remove lead at its source; this approach became the Lead Reduction Program.

In 2019, Denver Water became the first in the nation to receive approval from the U.S. Environmental Protection Agency and CDPHE to chart a new path with the Lead Reduction Program, one that permanently addresses lead exposure in drinking water by replacing all lead service lines in its distribution area within 15 years.



The Lead Reduction Program, launched in 2020, includes five components:

- 1. pH Adjustment:** This is the science component of the project. Denver Water increased the pH level of water delivered to customers to reduce corrosivity, which helps protect customers from lead and other materials getting into drinking water through lead service lines or household plumbing.
- 2. Inventory:** This is the data component that drives our construction schedule. This element also includes developing and maintaining a publicly accessible inventory of all customer-owned lead service lines in Denver Water's service area.
- 3. Lead Service Line Replacement:** The construction component of the project. Denver Water and its contractors are working year-round, replacing all lead service lines with copper lines at no direct charge to the customer.
- 4. Filter Program:** The proactive component of the program provides customers with a free water pitcher, filter and replacement filters certified to remove lead, at all properties suspected of having lead services lines.
- 5. Communications, Outreach and Education:** The people component of the program. Together with our community partners, we are working to increase community awareness of the important work of the program.

EQUIVALENCY MODEL

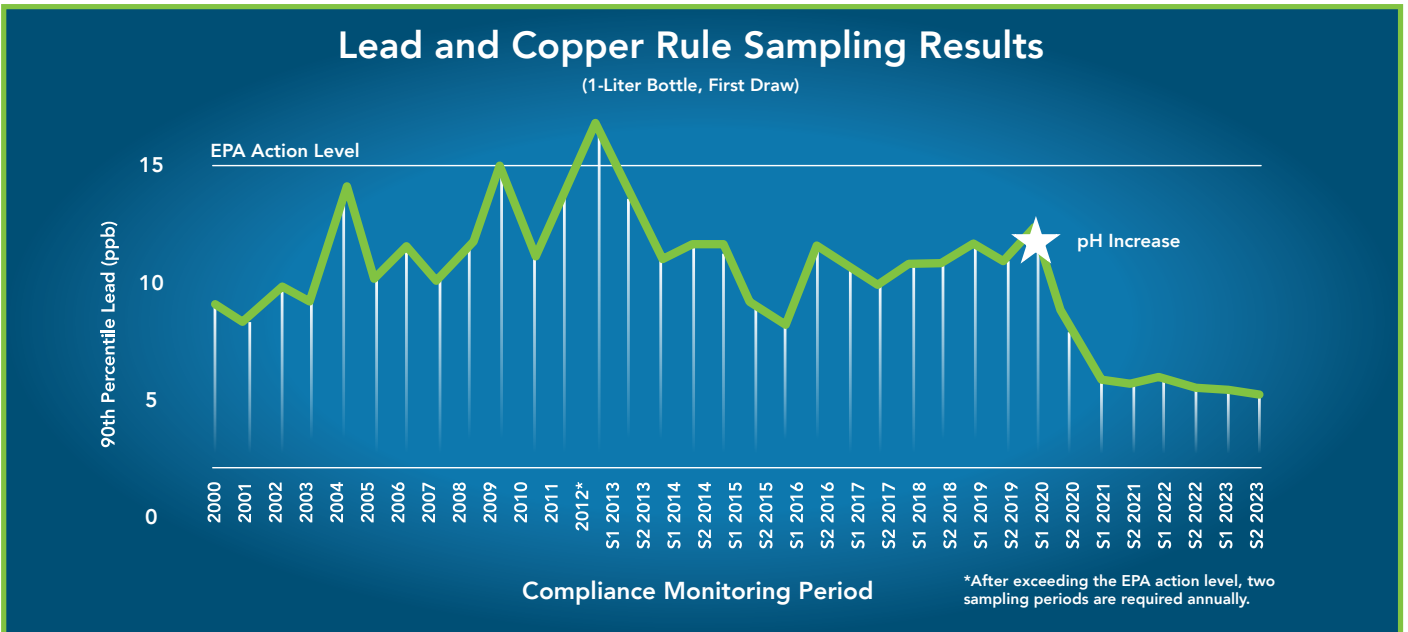
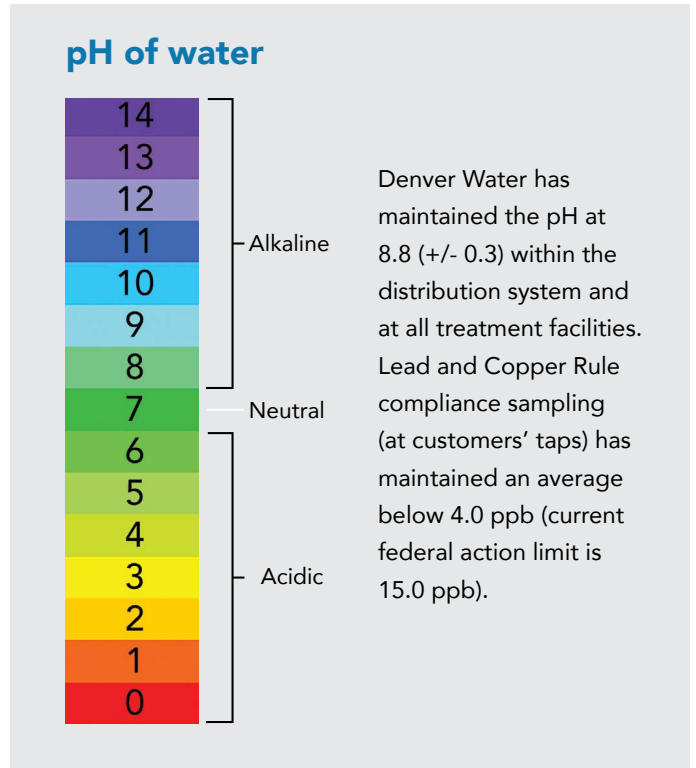
Denver Water actively manages its water chemistry throughout the distribution system not only to maintain compliance with all federal and state regulations, but also to ensure we are providing clean, safe, high-quality drinking water to customers. Managing water chemistry is a key component of the Lead Reduction Program.

As part of the program, Denver Water must use an equivalency model to prove to the federal and state regulating agencies that the Lead Reduction Program, along with all program components, is reducing lead levels at customers' taps as well as (or better than) the original mandated treatment method (orthophosphate).

The equivalency model uses a combination of data inputs to evaluate the amount of lead in drinking water against the projected levels of lead in drinking water from the previously mandated treatment (orthophosphate). These inputs include the probability of lead concentration at service line connections throughout the service area and data from actual pipes in the field with known higher levels of lead.

One of the steps Denver Water used to reduce lead levels was to increase the pH of the water (from 7.8 to 8.8). This increase strengthens the interior coating within the pipe to prevent lead release from corrosion.

Denver Water's pH management is performing well, with lead levels continuing to decline since the pH change was implemented in March 2020.



INVENTORY & INVESTIGATIONS

Inventory

One component of the Lead Reduction Program is the development and maintenance of a comprehensive (and publicly accessible) lead service line inventory. This inventory is a database of all service lines in the Denver Water service area.

The lead service line inventory is used to:

- Document water service line material composition and replacements.
- Conduct annual reporting.
- Respond to new data about service line composition.

The inventory also incorporates results from investigative activities, including pothole investigations, interior inspections, water quality sampling, lead service line replacements and data analysis, all of which help determine the material of the service line at each property. Service line materials vary and include lead, galvanized steel, copper and other materials, like ductile iron.

Investigations

A requirement of the Lead Reduction Program includes annual investigation of all unknown service lines identified

in the inventory at a rate of 1.4%, or about 1,169 lines.

The investigations include desktop evaluation, water quality sampling and/or potholing/visual inspections. To comply with the upcoming changes to the Lead and Copper Rule, referred to as the Lead and Copper Rule Revisions, Denver Water has increased its investigations of unknown services lines. Since 2020, Denver Water has completed over 90,000 investigations.

2023

The number of investigations exceeded the annual target by 175% (nearly 78,000 in 2023 alone). These investigations help increase the precision of the total inventory and support preparation for the Lead and Copper Rule Revisions. Denver Water originally estimated that there were between 64,000-84,000 lead service lines within the inventory. As of the end of 2023, more than one-third of lead service lines have been replaced (24,000 and counting). Denver Water continues to actively refine the inventory through investigations. At the time of this report, the inventory of lead service lines is 61,000–69,000. This range will continue to narrow with more investigations and lead service line replacements occurring through the program.

The Predictive Model: A Learning Tool to Increase Inventory Accuracy & Program Efficiency

Denver Water uses an innovative tool, referred to as the predictive model, to strengthen information within the inventory. The model guides decision-making and helps determine where further investigation is required.

The model works by looking for patterns in a variety of data sets, including data on properties, water mains and more to predict service line locations and material types (lead or non-lead). The model uses statistics and learns from continuous data input to improve

the overall strength and confidence of the model over time.

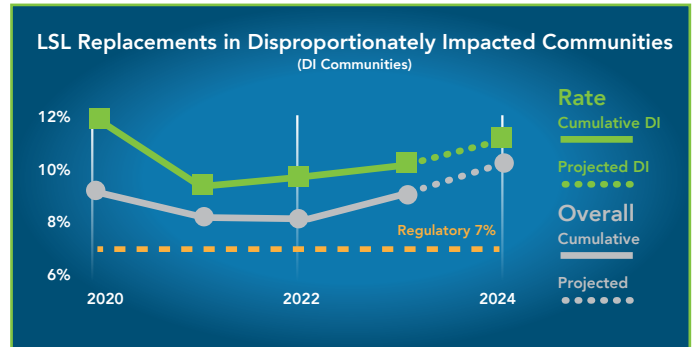
Denver Water evaluates a variety of metrics over different geographic areas to ensure that the predictive model performance remains strong and consistent. To date, the predictive model has an overall accuracy of 95%, with the latest testing data reaching a range at or just over 97% accuracy. There are areas where the model is slightly less certain. To resolve the uncertainty and improve the overall model, we perform physical investigations to verify model predictions. We use historic records, the predictive model and physical investigations to reinforce the service line material designation.

LEAD SERVICE LINE REPLACEMENT

The primary source of lead in drinking water is customer-owned lead service lines, the pipes that bring water from the water main in the street to the plumbing in the home. The Lead Reduction Program is replacing customer-owned lead service lines with copper service lines at no direct charge to the customer.

Because property owners, not Denver Water, own water service lines, information on what they are made of has historically been inconsistent and scattered among a variety of sources. Denver Water developed a comprehensive inventory of known and suspected lead service lines using a combination of property records (homes built before 1951 are more likely to have lead service lines), water quality tests and visual inspections (potholing and interior inspections) of service lines. The inventory is continually updated with new data from investigations.

Denver Water replaces any customer-owned lead service line with a copper water line when discovered during a construction or maintenance project. Through the Lead Reduction Program, Denver Water is accelerating the pace of replacing customer-owned lead service lines. When initially launched, all lead service lines were projected to be removed by 2032, based on a 7% cumulative annual replacement rate.



2023

In 2023, Denver Water began using federal funding dollars, awarded in 2022, to support lead service line replacements. By the end of 2023, 6,891 lead service lines were replaced, exceeding the annual replacement rate by 150%. By year's end, 6,891 lead service lines were replaced, with 1,500 completed using federal funds, exceeding the annual replacement rate by 150%. To date, Denver Water has replaced over 25,000 lead service lines since the program launched in 2020.

Additionally, Denver Water was required to include a new metric to evaluate the rate of lead service line replacement in disproportionately impacted communities in comparison to the overall replacement rate. Regulating agencies want to ensure that these communities are receiving the same (if not higher) rate of lead service line replacements.

Denver Water and its contractors take pride in not only getting the lead out, but also treating customers as we want to be treated.

There are numerous examples that occur throughout a given year in the program. This past year, our contractor crew helped make a customer's driveway accessible again after

asphalt disruption from a main break. The contractor and their paving subcontractor added a ramp from the private driveway to the street that provided the resident access to their garage. The crews also backfilled settling portions around the site and smoothed out the remaining heaving asphalt from the main break. This is an example of Denver Water's good neighbor commitment in action.

COMMUNITY OUTREACH

Effective outreach and communication with affected customers is a crucial aspect of the Lead Reduction Program. We use various channels, which include print mailings, advertorials, email newsletters, the website, virtual community meetings, social media posts, in-person events and marketing campaigns to educate and inform individuals about the program and, most importantly, the necessary steps they need to take. To support this work, Denver Water has established a bilingual (English and Spanish) communications, outreach and education program.

Because property owners, not Denver Water, own service lines, community partners are critical in helping owners and renters understand their role in the program. Denver Water created an Ambassador Program to reach more people, in more places, in their preferred language and in a culturally responsive manner to build trust and behavior change. Denver Water and its community partners share information in multiple languages and conduct culturally relevant outreach activities.

Together with community partners, Denver Water has created a framework to:

- Establish awareness about the Lead Reduction Program and maintain engagement in disproportionately impacted neighborhoods and cultural communities.
- Promote the importance of replacing lead service lines and what customers need to do to participate in the replacement process.
- Create and sustain behavior change for customers with lead lines to filter water before drinking, cooking and preparing infant formula.
- Encourage participation in and awareness of other program components, such as water quality sampling.



2023

Reaching people at their home:



- Nearly 500,000 touch points through direct mail, phone calls and digital outreach.

Increasing community awareness and understanding through outreach and events:



Virtual community meetings

Six events with nearly 4,000 participants.

Community partner events

230 events with over 30,000 participants.

Stakeholder advisory committee

Met quarterly with representatives reflecting a diverse group of organizations, including health care, education, nonprofit and government.

Government meetings

Over 100 times, we coordinated with the Denver City Council, Denver Mayor's office and officials in suburban jurisdictions and proactively shared program progress and expectations for 2024.



Denver Water diligently works to gain consent to complete service line replacements. Not all customers respond, even with multiple outreach attempts. Over the past year, with the help of community partners', we collected 15% more consent forms in areas where we hadn't heard from all customers. The partner's door-to-door canvassing approach with face-to-face conversations and follow-up email/phone contact help establish a personal connection to gain consent and in turn, support overall program success.

FILTERS

Denver Water provides all customers with a known or likely lead service line a water pitcher, filter and replacement filters at no direct charge until those customers' service lines can be replaced. Customers received their initial filter and replacement filters when the program launched in 2020. Replacement filters are sent, at no cost, on a rolling five-month basis to all customers enrolled in the program. Replacement water pitchers are sent to new occupants (renters and owners) and to those needing a replacement or additional pitcher due to household needs.

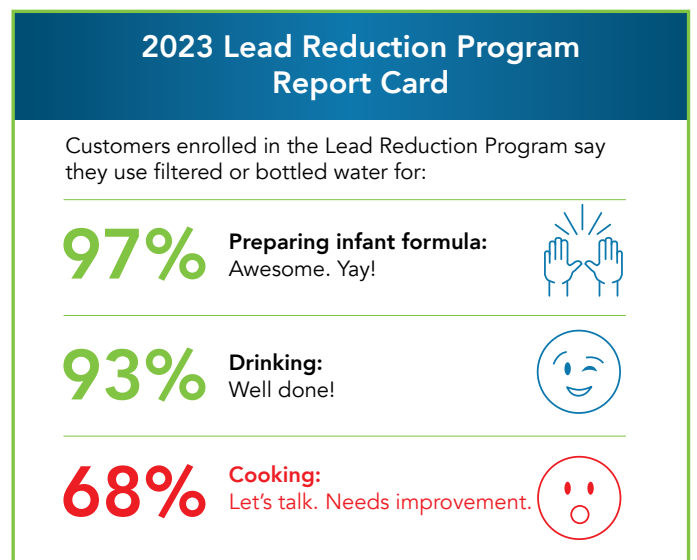
To assess how well customers are adopting the use of filters for drinking, cooking and preparing infant formula, Denver Water surveys customers to understand the use of the pitcher filters and filtered water. This survey was completed annually 2020-2023. Beginning in 2024, the survey will be conducted every other year.

2023

Over 76,000 replacement filters were sent to customers enrolled in the Lead Reduction Program. The filter adoption survey was sent to 15,000 randomly selected customers. The adoption rate for overall filter use is 83%. Use of filtered water for drinking and preparing infant formula remains consistently high, while use of filtered water for cooking has shown a gradual increase over the years. The next survey will be conducted in 2025.

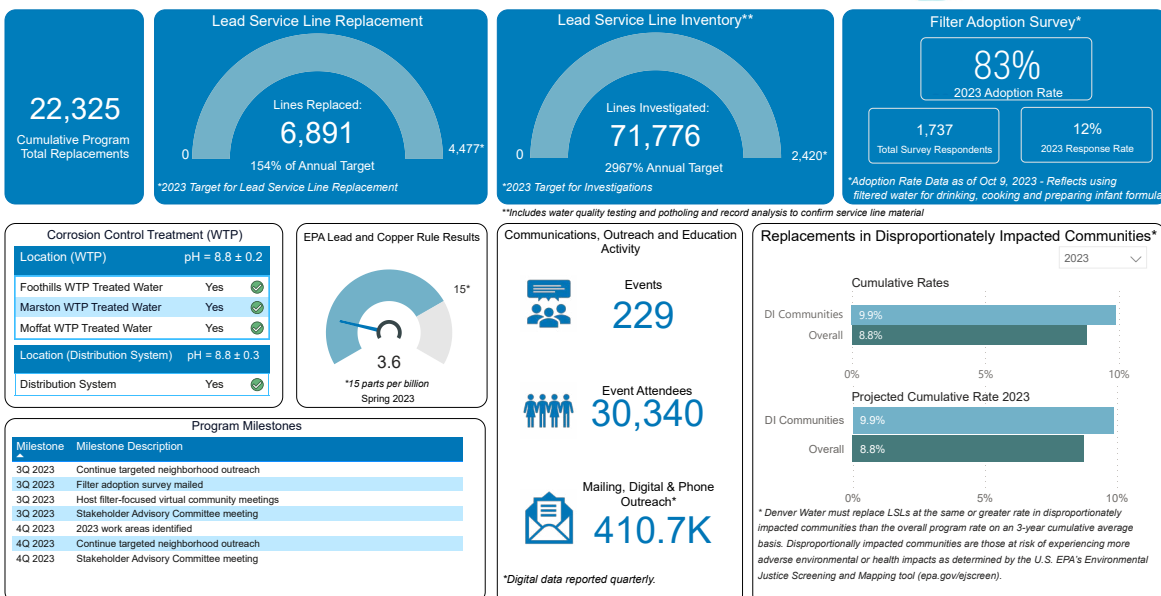


Photo credit: Denver Water



LEAD REDUCTION PROGRAM

Report Period 2023 (Data to Dec. 31, 2023)



FINANCIAL

Denver Water is replacing customer-owned lead service lines and providing filters to customers until their lead service line is replaced at no direct charge to the customer. Protecting the public from the potential impacts of customer-owned lead service lines installed during the first half of the 20th century is estimated to cost over \$650 million dollars over the life of the program.

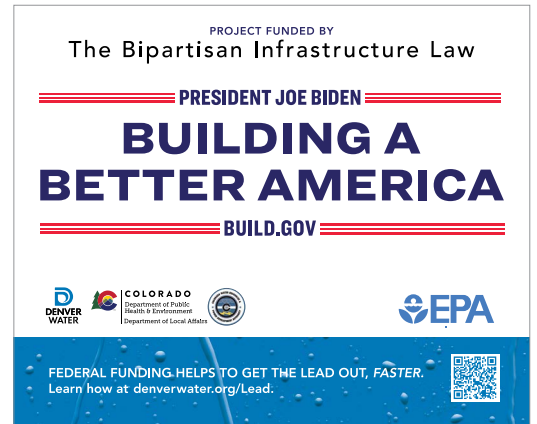
The program cost is being covered through water rates, bonds, new service fees and hydropower generation, in line with other large capital improvement projects regularly undertaken by Denver Water. Rates are reviewed annually to ensure we can fund capital and operating expenses while keeping rates as low as possible for our customers. Metro Water Recovery has also invested \$22.5 million to support this program.

In 2022, Denver Water was approved for \$76 million from the Colorado Drinking Water State Revolving Fund, which received

money from the federal Bipartisan Infrastructure and Investment Act signed into law by President Joe Biden in November 2021. The state approved allocation of funds to Denver Water in October 2022, and the Denver Board of Water Commissioners formally accepted the funds Dec. 7, 2022. The money Denver Water received is a low-interest loan that the utility will repay, with \$40 million of the loan's principle forgiven immediately, as allowed by the legislation.

The funding helps fast-track the program, replacing thousands more customer-owned lead service lines in the next few years than originally anticipated. In 2023, over 2,000 additional lines were replaced.

Denver Water plans to use the funds from 2023 to 2025 to replace an additional 6,750 lead service lines, shortening the length of the program by 1.5 years.



WHERE WE'RE HEADED IN 2024

CONSTRUCTION

The program will shift to year-round construction, which means more mailings, virtual community meetings, construction coordination, community outreach and coordination with city council offices.

Denver Water will continue to use its remaining federal funding to accelerate construction.

In 2024, there are 33 neighborhoods slated for construction and an additional 13 neighborhoods planned for investigative potholing. As we move through the program, our suburban service areas are beginning to emerge as areas for investigation activities and increased outreach.

FILTERS

We'll continue to distribute replacement filters to customers in the Lead Reduction Program approximately every five months and focus our outreach efforts on encouraging proper filter use. We will also continue to conduct outreach to leasing offices, property management companies and property owners of multi-unit buildings, above and beyond what is required, to provide pitchers and filters to new tenants that move into buildings identified in the program.

COMMUNITY

Our community partners will continue their work while we also seek opportunities for new partnerships to reach additional communities or environmental sustainability opportunities.

UPCOMING CHANGES TO LAWS ABOUT LEAD

Preparing for and implementing the Lead and Copper Rule Revisions will continue to be a big focus in 2024. We will not only need to update our inventory, but communicate the updates to customers and stakeholders.

- The Lead and Copper Rule created a new "trigger level," set at 10 parts per billion, at which a utility must make plans for how to control lead contamination should it rise to the action level of 15 ppb. Denver Water will conduct water quality sampling across the system at specific sampling sites (homes) in compliance with the new rules.
- Sample collection will increase from three 1-liter bottles to five 1-liter bottles, so that test results are more likely to identify a lead service line.
- The online lead service line inventory map categories will be updated under the revisions to the Lead & Copper Rule. The current categories of "Likely" and "Unlikely" lead service line will change to "Unknown" status. Denver Water will communicate these changes to customers within the new Unknown category.
- All properties with an unknown status of their service line will receive annual communication about the status of their service line until the service line has been replaced or determined to be free of lead.
- Denver Water will send water quality test results out to customers within three days, regardless of the result, to provide information to customers more quickly.



THANK YOU TO OUR PARTNERS

PROGRAM ADMINISTRATION AND SUPPORT



SERVICE LINE REPLACEMENT CONTRACTORS



WATER QUALITY TESTING



FILTER PROGRAM



COMMUNITY PARTNERS



COMMUNICATION PARTNERS







DENVER WATER
LEAD REDUCTION PROGRAM

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Learn more about the Lead Reduction Program
at denverwater.org/Lead or denverwater.org/Plomo.

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