Agenda

• Lead Reduction Program - overview
• Equity and prioritization
• Prioritization model
• Q&A
A History of Lead in Drinking Water

1918 Denver Water Established

1951 Denver Water Changes Standards
Denver Water allows use of galvanized steel and copper pipes instead of lead for customer-owned service lines.

1977 Lead Banned from Paint
The Consumer Product Safety Commission bans lead from the consumer paint market to take effect in 1978.

1991 Lead Removed from Gasoline
Amendments to Clean Air Act require lead be removed from gasoline by 1995.

1994 Denver Water Identifies pH Adjustments to Reduce Corrosion
Denver Water begins using pH adjustments to reduce lead levels in water from customers’ owned lead service lines.

1994 Reduction of Lead in Drinking Water Act Passes
Congress passes Reduction of Lead in Drinking Water Act, lowering the amount of lead allowed in “lead-free” household faucets and parts.

2011 Denver Water Launches Lead Reduction Program
Denver Water launches ongoing program to continue education and reduce lead in drinking water, including replacing lead service lines during construction, offering free lead testing, community meetings, school-based outreach, collaboration with community partners, and more.

2018-2019 Denver Water Launches Lead Reduction Program
Denver Water studies impact of orthophosphate as well as elements of an alternative solution by requesting a variance to add an accelerated lead service line replacement program, filter program, and increasing pH for corrosion control, with final proposal due August 2019.

Pre-1951
Lead as Industry Standard
Lead is used to make customer-owned service lines that carry drinking water from main pipelines into homes and businesses.

1971 Denver Water Bans Use of Lead in Service Lines
Fifteen years before a national ban would be enacted, Denver Water bans use of lead in customer-owned service lines.

1986 Lead Pipes Banned
Congress approves amendments to the Safe Drinking Water Act, banning lead pipes and phasing out lead solder.

WQA, 1991 Lead and Copper Rule establishes water quality testing requirements and action levels for corrosion control. In 1992 Denver Water begins testing water from homes with known lead service lines.

1991 Denver Water Sampling Exceeds Action Level
Denver Water identifies homes with lead service lines that exceed EPA’s action level by 2 parts per billion (ppb).

2012 Denver Water Conducts Public Education Campaign and Study
Denver Water launches extensive public education campaign and begins detailed study and analysis of optimal corrosion control methods to enhance protection for customers with lead service lines and plumbing.

2012-2017 CDPHE Designates Orthophosphate
In response to 2012 sampling, CDPHE designates use of additive orthophosphate to reduce risk of lead in drinking water.

2018 (March) CDPHE Designates Orthophosphate

2019 (Dec. 16, 2019) EPA Approves Variance
Denver Water will commence lead reduction program beginning in 2020.

2019 Denver Water Will Commence Lead Reduction Program

Learn More:
303-993-2444
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denverwater.org/Lead

DENVER WATER
Lead Reduction Program Elements

Corrosion Control Treatment
Optimize corrosion treatment

Lead Service Line Inventory
Identify and track all the probability of service line compositions

Filter Program
Provide a filter to each dwelling unit in the program

Accelerated Lead Service Line Replacement
Full replacement of non-copper service lines (paid for by Denver Water)

Communications, outreach and education
Provide strategic information to promote understanding and adoption
Community Outreach and Education (COE)

- Public initiative to understand the program
  - The importance of the program and capital expenditures for long term health benefits
  - How to be part of the program filter / flush / replace
- Requires a broad COE implementation strategy
  - Multi-cultural resources (translation and interpretation, training of staff)
- Local partners
  - Trusted community groups
  - Provide focused outreach to diverse populations to increase program success
  - Coordinate efforts with construction aspects
Program Prioritization

Challenges

- Multi-year program
- Large diverse work area
- Coordination with other CIP
- Yearly Goals

Solutions

- Risk prioritization model
- Human health impacts
- Equity in water

Program Activities

- Strategic messaging and outreach
- Filter distribution and maintenance
- Construction coordination
Prioritization Model

• Risk of exposure “focus driven”
• Identification of the critical lead exposure customers
• Risk analysis (likelihood of lead and consequence (equity)
  • Odds ratio for elevated childhood blood lead levels
  • Income distribution statistics
  • Proportion of Population of Minority Status
  • Neighborhoods with high density of young children
  • Woman Infant Children (WIC) Participation
Evaluate Model Plan

- Evaluate results for meaningful decisions
- Apply local knowledge
- Interpret the results
## Construction Implementation

<table>
<thead>
<tr>
<th>Work Types</th>
<th>Description</th>
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<tbody>
<tr>
<td>Individual</td>
<td>Individual scores are considered for properties defined as high consequence but are geographically isolated.</td>
</tr>
<tr>
<td>Geographic Area</td>
<td>Combined scores are considered for properties where the categories of known and possible lead scores define an area.</td>
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<tr>
<td>Identification</td>
<td>Gather more information where necessary to produce refine the inventory</td>
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</tbody>
</table>

![Map with Legend]

**Legend**

- **Purple Square**: Confirmed lead service line; included in replacement program.
- **Empty Square**: Likely to have a lead service line; included in replacement program.
- **Orange Triangle**: Unlikely to have lead service line; free water quality test available.
- **Green Circle**: No lead service line.
Filter Program

• Distribution of filters
  • Sequences based on prioritization model
  • Aggregation of the risk model to support the distribution numbers (how many can fit in a truck in a week)
  • Accompanied with an outreach strategy to educate on the importance of use.

• Assess filter adoption
• Direct outreach for informal data capture
Key Points

Funding
• Denver Water is paying for LSL replacements

Define Metrics
• Define an approach to measure the success
• Collect the necessary data

Learn by Doing
• Collect data to evaluate and adjust
• Develop an adaptable program

Provide knowledge for success
• Getting to know the community (vulnerable populations, renters, language barriers, and cultural needs)
• Provide the greatest benefit to public health
• Evaluate / Assess / Adjust
QUESTIONS?