

OCCT Variance to SDWA

September, 2021



Optimal Corrosion Control Treatment (OCCT):

Denver Water – Nicole Poncelet Johnson

CDPHE – Ron Falco

BMW – Dan DeLaughter, Steve Lundt



“Hang together or hang separately”



Discussion

- History With Lead
- SDWA Variance Effort
- CWA Contributions
- Outcomes

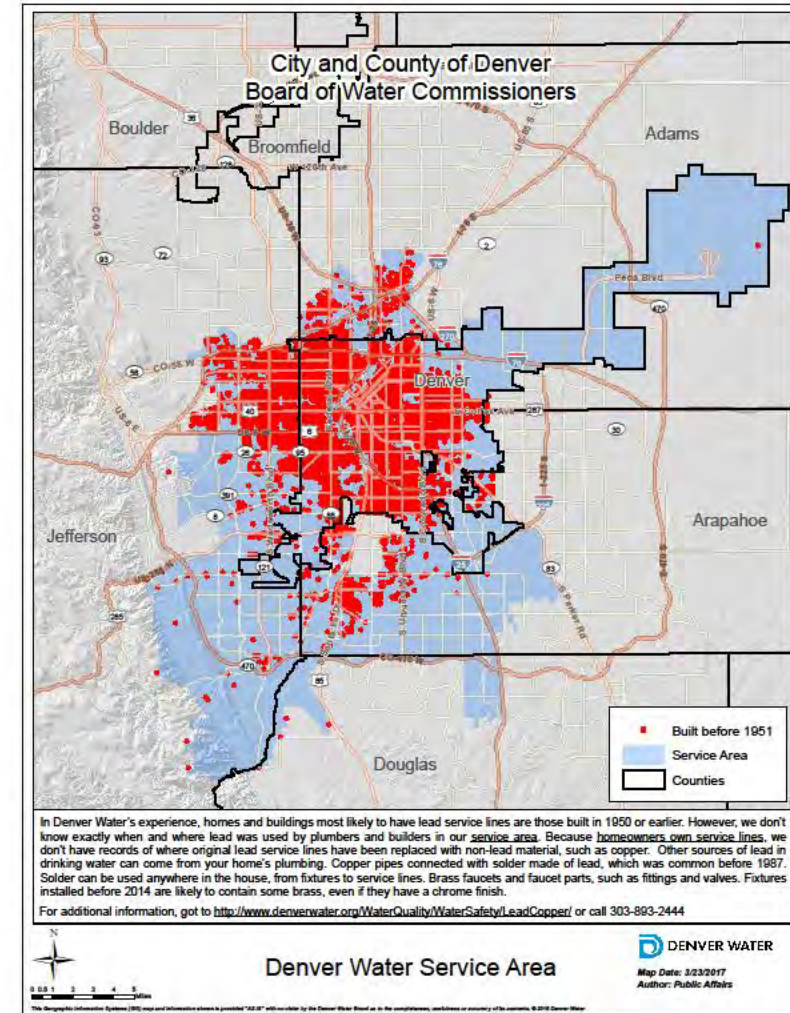


A horizontal blue banner with a background of water droplets and ripples. The text "History with Lead" is centered in white.

History with Lead

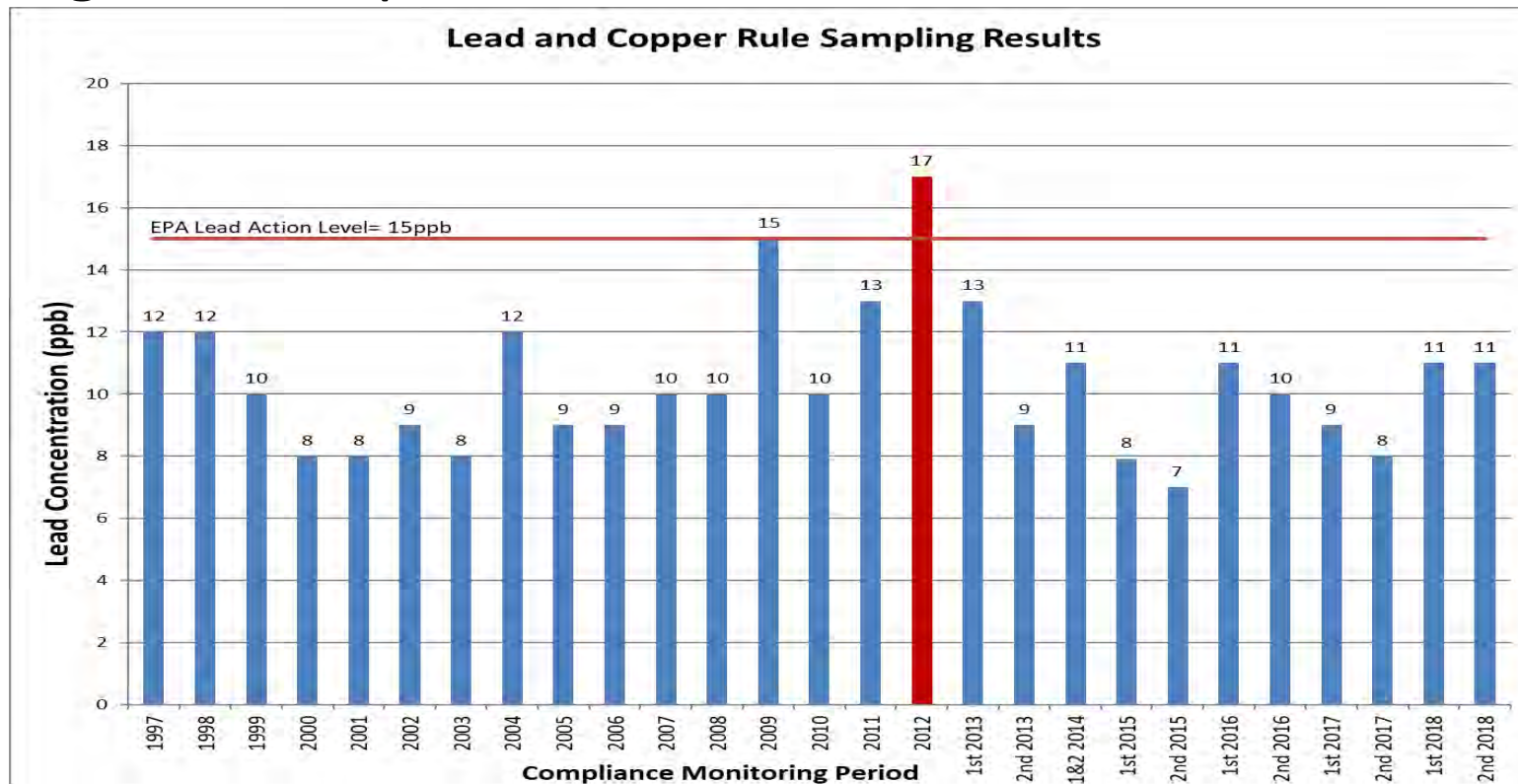
Denver Water Service Area

- Serve 1.5 Million People in Denver, Colorado, USA.
- Homes in our service area that were built late 1800s to 1950 are more likely to have lead service lines
- Limited records, est. 64,000 Lead Service Lines

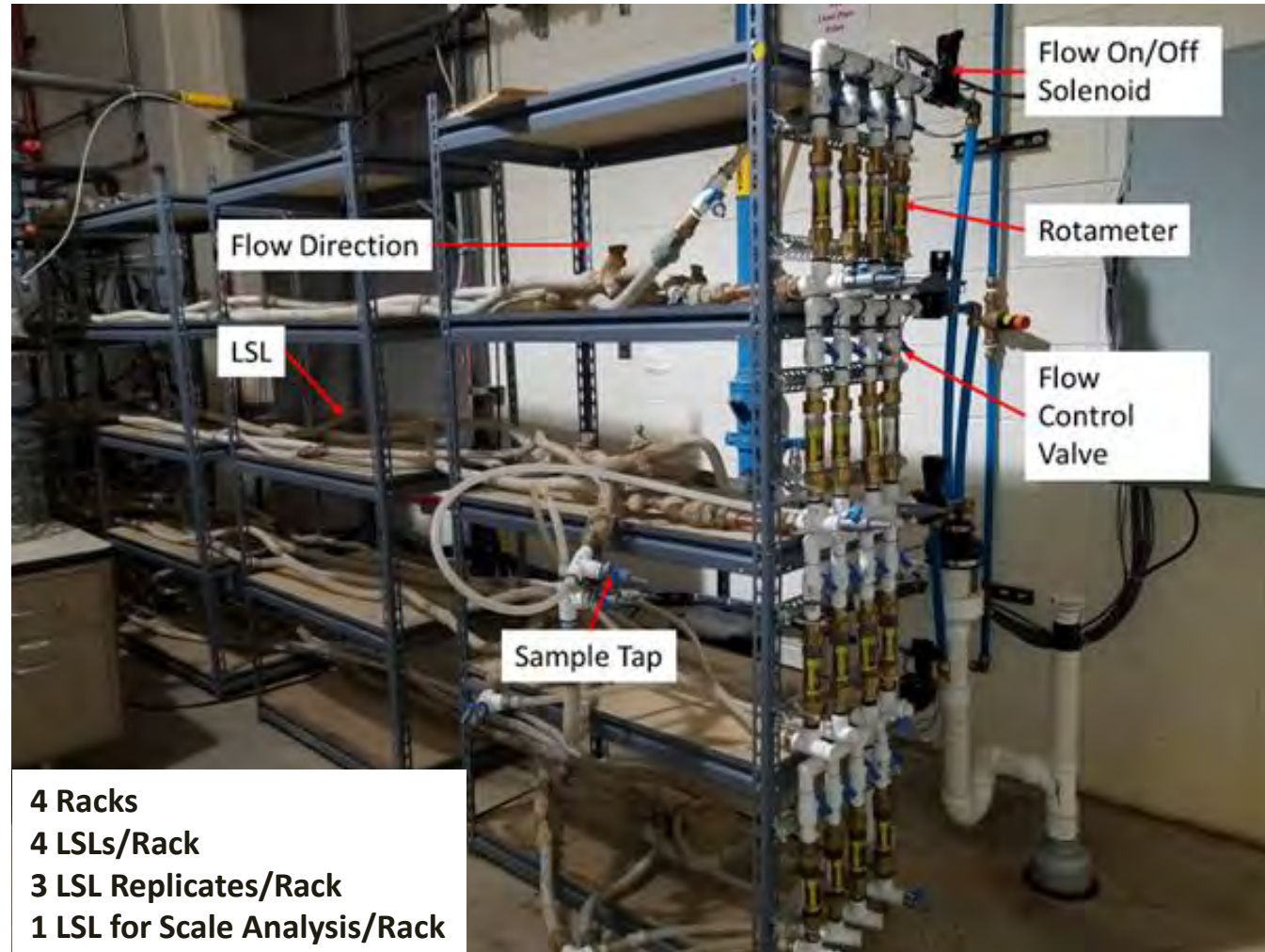


Current Lead and Copper Rule

- Denver Water must comply with the Lead and Copper Rule under the Safe Drinking Water Act
- Denver Water exceeded the Action Level for Lead in 2012, leading to a compliance order from CDPHE



Lead Service Corrosion Control Piloting 2012 to 2017



Times 2 for Two Water Supplies

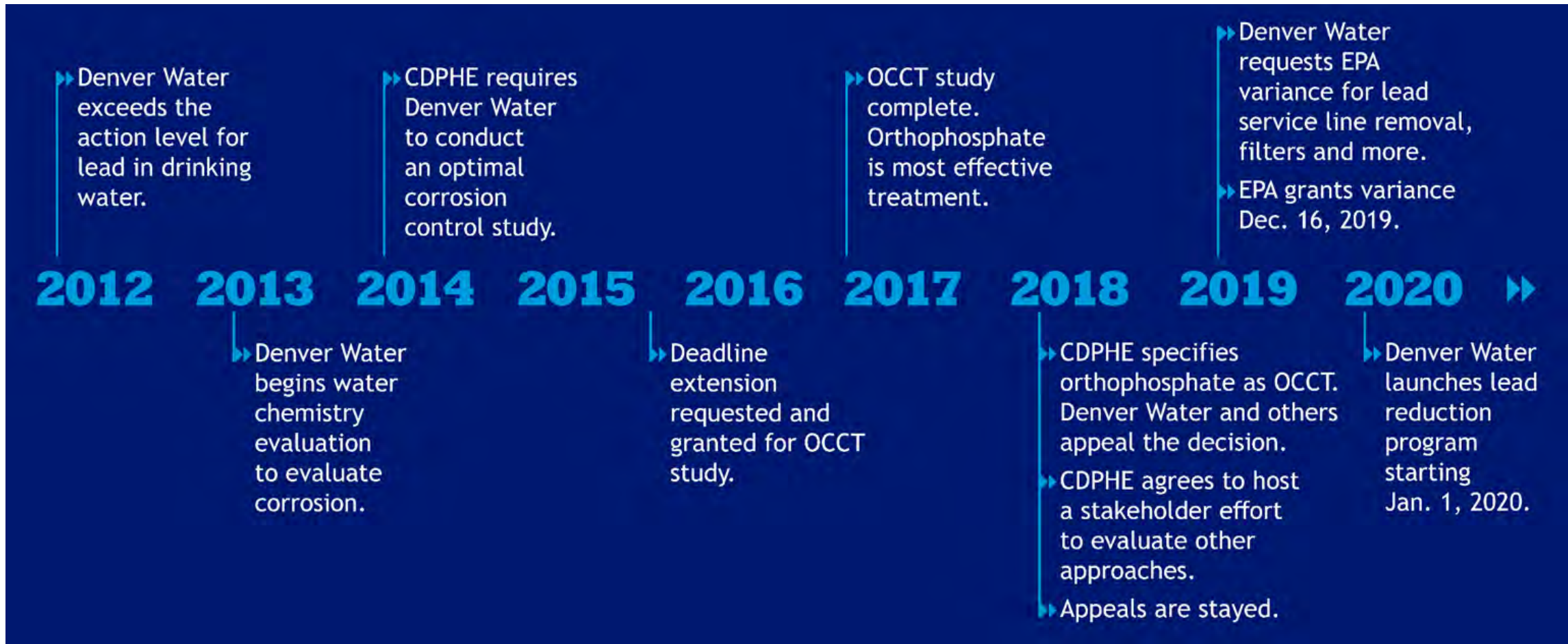


Summary of OCCT Results Submitted in 2017

| Pilot Plant Location | pH 8.8 | Orthophosphate |
|---|----------------------------------|---|
| Treatment Plant A (representing 80% of Denver Water's supply) | Median Reduction: 35% to 51%* | Median Reduction: 66% to 72%* |
| Treatment Plant B (representing 20% of Denver Water's supply) | Median Reduction: 57% to 72%* | Median Reduction: 64% to 81%* |



Timeline of Denver Water OCCT activities



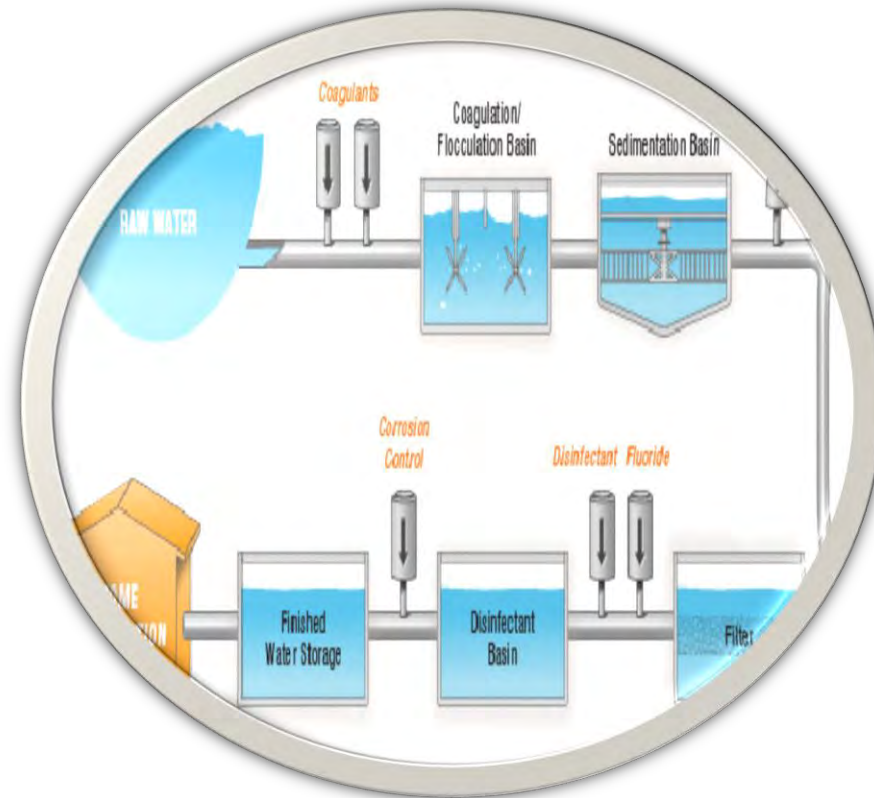
A horizontal blue banner with a background of water droplets and liquid splashes. The text "SDWA Variance Effort" is centered in white.

SDWA Variance Effort

Denver Water's Commitment to Public Health & the Environment

Protecting Public Health

3 Filtration Treatment Plants
70,000 Water Quality Tests Annually



Protecting Water Supplies

Wildfire, drought, nutrients, mine drainage



Internal Support: Alternative Public Health Solution?

8.8 pH/alkalinity adjustment
+ 7% Lead Service Line Replacement

= Equivalent Public Health Protection ?



Negotiations And Research Intersect

8.8 pH/alkalinity adjustment

- + 7% Lead Service Line Replacement
- + Filters (NSF 53)

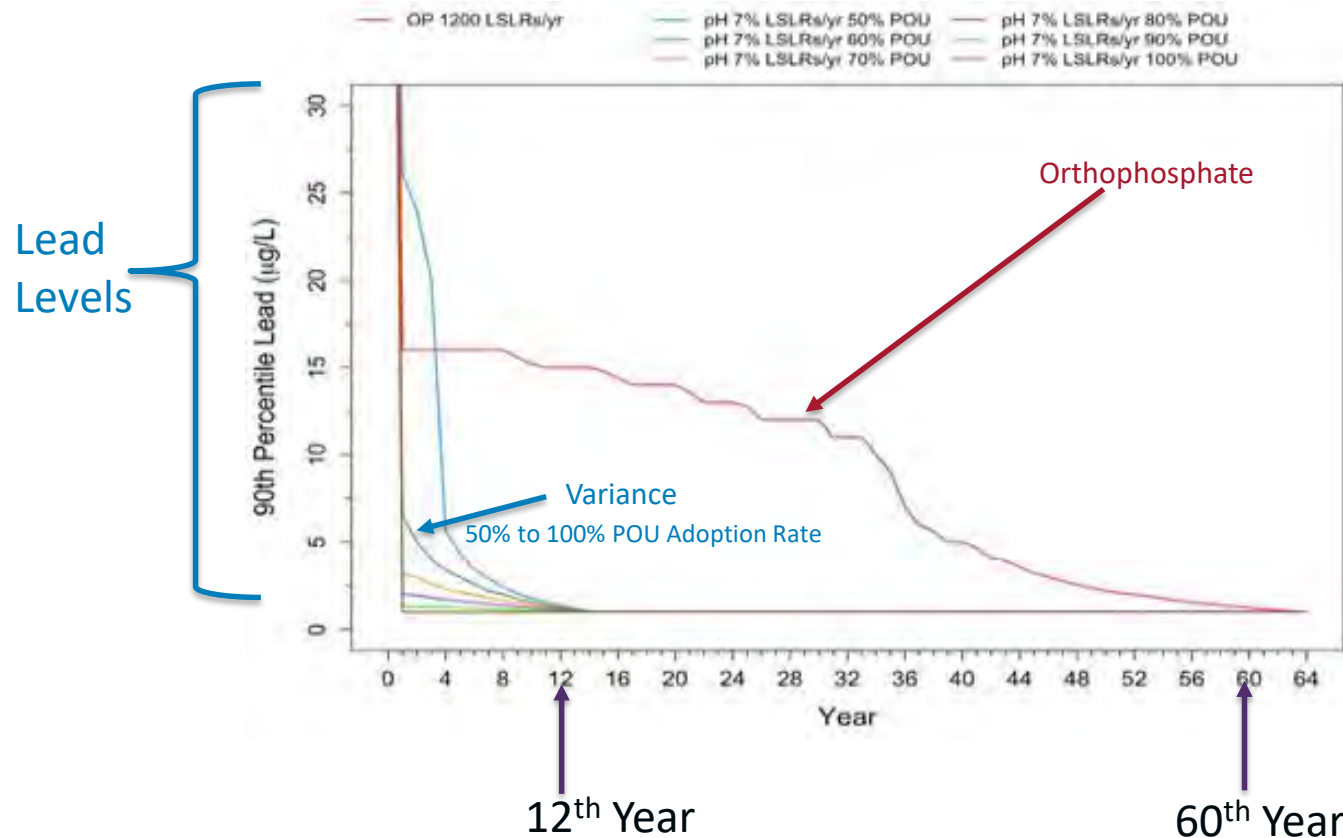
= Equivalent Public Health Protection ?



Variance: Seeking an Alternative Solution

- Denver Water proposed an alternative, holistic and permanent lead reduction approach to orthophosphate
 - Achieves lowest lead levels in **15 years vs. 60 years**

Lead Level Comparison by Method



Based on data from lead pilots, which produces higher lead levels than seen at customer taps.

Variance: Denver Water's Commitment to Public Health and a Regional Solution

- Denver Water submitted treatment technique variance to the Safe Drinking Water Act for Optimal Corrosion Control Treatment:
 - pH 8.8 CCT
 - 7% min LSLR
 - Pitcher filters
 - Develop on-line LSL inventory
 - Communication, outreach, and education



A horizontal blue banner with a background of water droplets and ripples. The text "CWA Contributions" is centered in white.

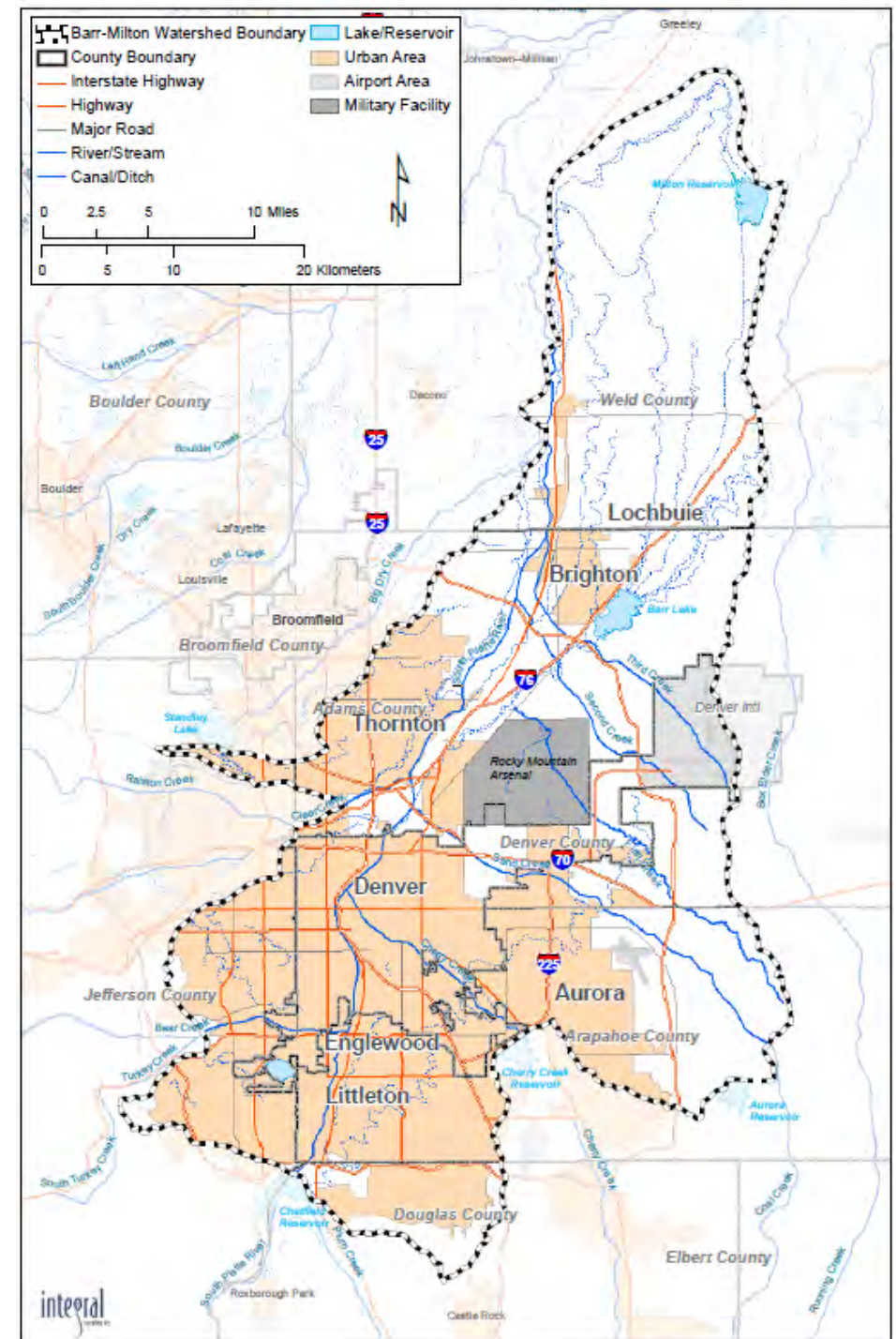
CWA Contributions

Overview of BMW

Formed to address identified pH and D.O. impairments in Barr Lake and Milton Reservoir

Comprised of members including WWTPs, DW providers, stormwater, and agriculture

Phased TMDL for pH and D.O.



BMW Membership

| | | Active | | |
|--|--|---|---|--|
| | | Burlington Ditch Land & Reservoir Company | | |
| Sustaining | | SPCURE | | |
| Centennial WSD | | Suncor | Supporting | |
| City of Thornton | | Adams County | Denver Water | |
| East Cherry Creek Valley WSD | | | Big Dry Creek Watershed Association | |
| Farmers Reservoir & Irrigation Company | | | Friends of Barr Lake | |
| South Platte Renew | | | Henrylyn Irrigation District | |
| Metro Water Recovery | | | Town of Lochbuie | |
| South Adams County WSD | | | North Front Range Water Quality Association | |
| United WSD | | | XCEL | |
| City and County of Denver | | | City of Aurora | |
| | | | Heritage Sporting Club | |

BMW TMDL TP Sources & Reductions

TMDL Targets

- Target TP = 0.1 mg/L
- pH = 9.0 s.u.
- D.O. = 5.0 mg/L
- Chl-a = 25 µg/L

TMDL Reductions

- Barr = 70,400 lbs → 5,800 lbs
- Milton = 39,000 lbs → 5,300 lbs

Achieved By

WWTPs 96% reduction
Stormwater 20% reduction
Background 40-75% Reduction



Where would new Denver Water load fit?

How did BMW get involved?

Coalition building/lawsuit

- Denver Water, Greenway Foundation, Aurora

BMW represents tangible impacts

- Hypothetical concern → Real TMDL and cost implications
- Broad membership, easier to pool resources and efforts
- Lots of data available

It was the right thing to do

- DW plan protects more people more quickly
- Limits environmental impacts from increased chemicals
- Avoids legacy problems in two heavily utilized urban adjacent lakes

Mass Balance Modeling Phosphorus from OCCT

Outdoor Use for 2020 and 2050

Groundwater

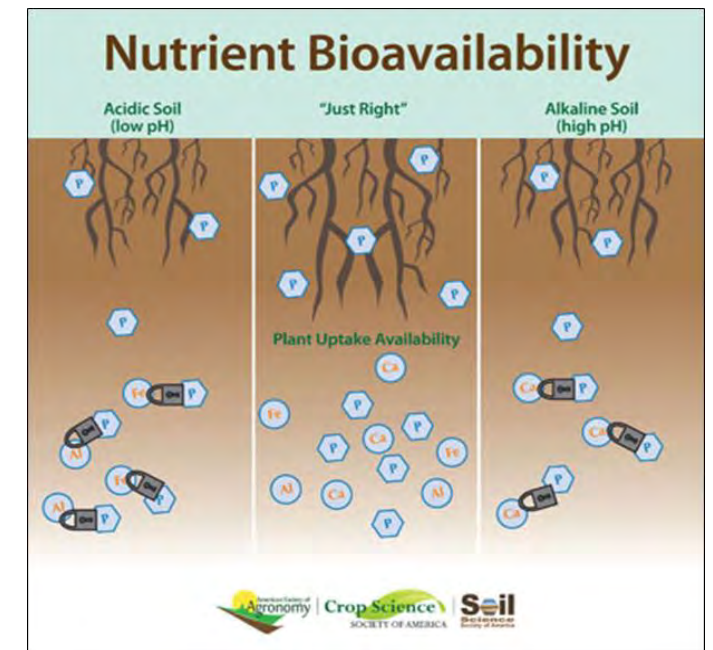
- Mobility (soil retention, soil adsorption capacity, location to streams)
- Urban soil types & characteristics
- Timing

Lawn Irrigation Return Flows (LIRF)

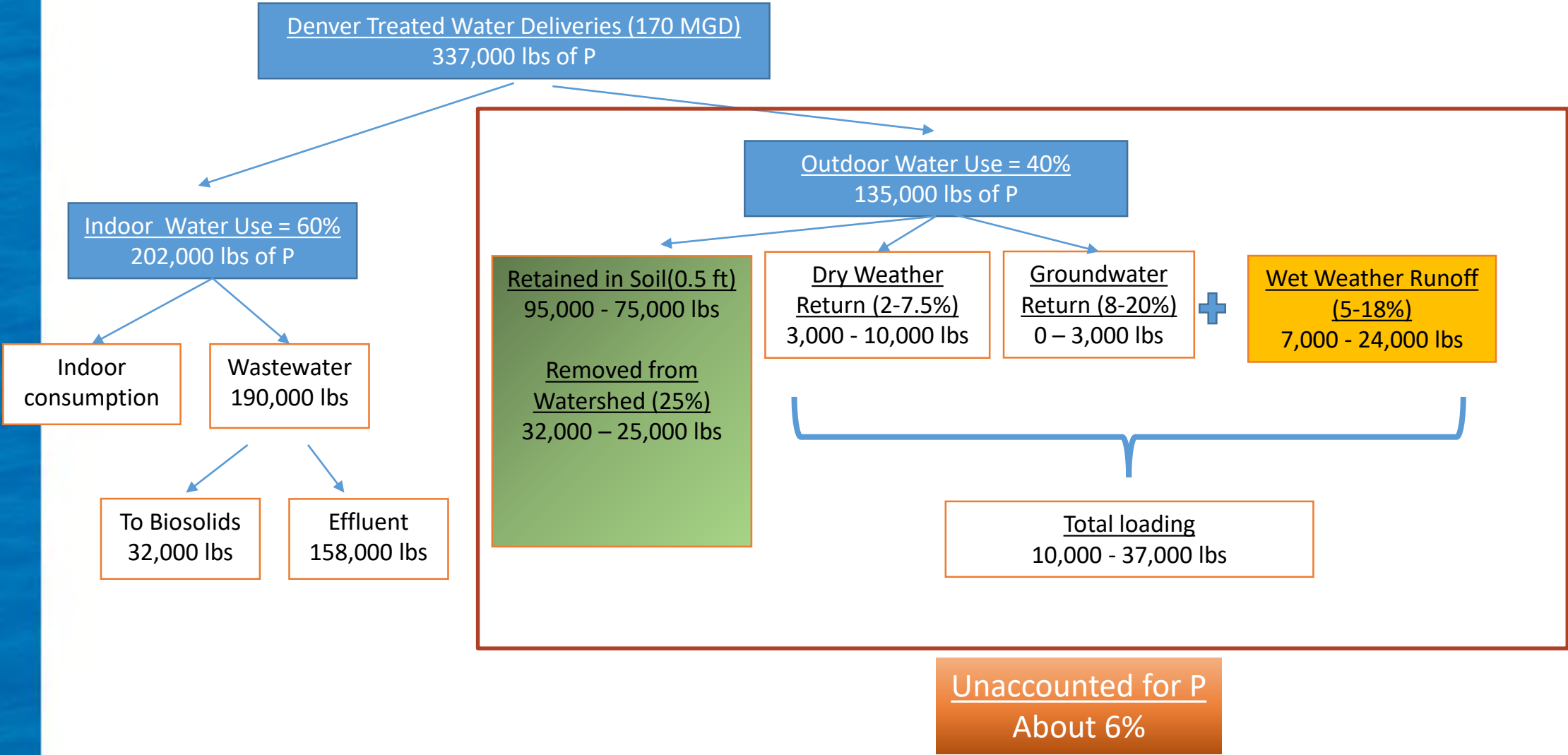
- Dry & Wet weather impacts
- Timing & Location

How much then gets to Barr and Milton?

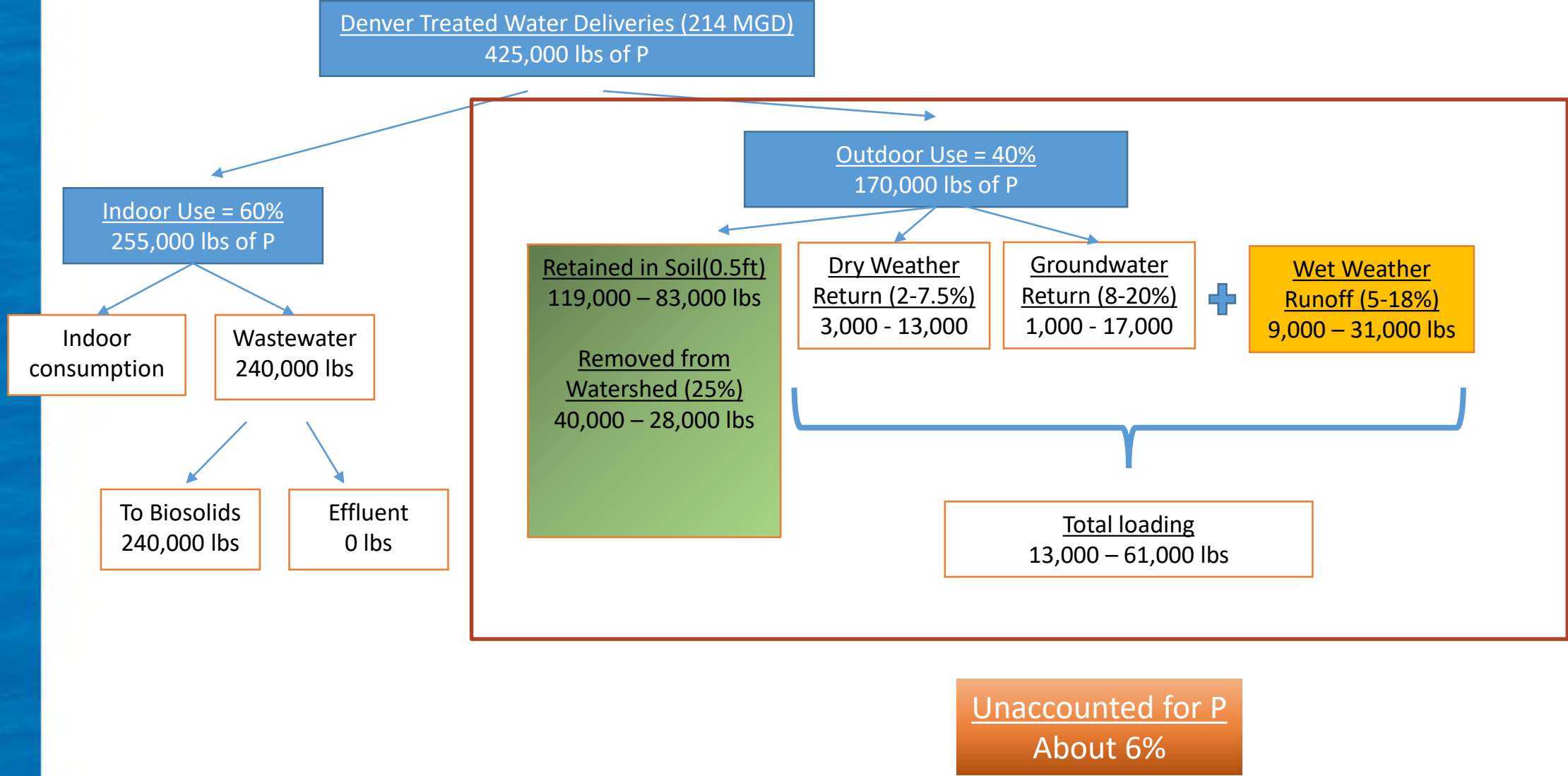
- Reservoir Management
- Weather



2020 Conceptual Watershed Phosphorus Loading Increase Loading in lbs/year (low and high estimates) at 2 mg/L as PO4



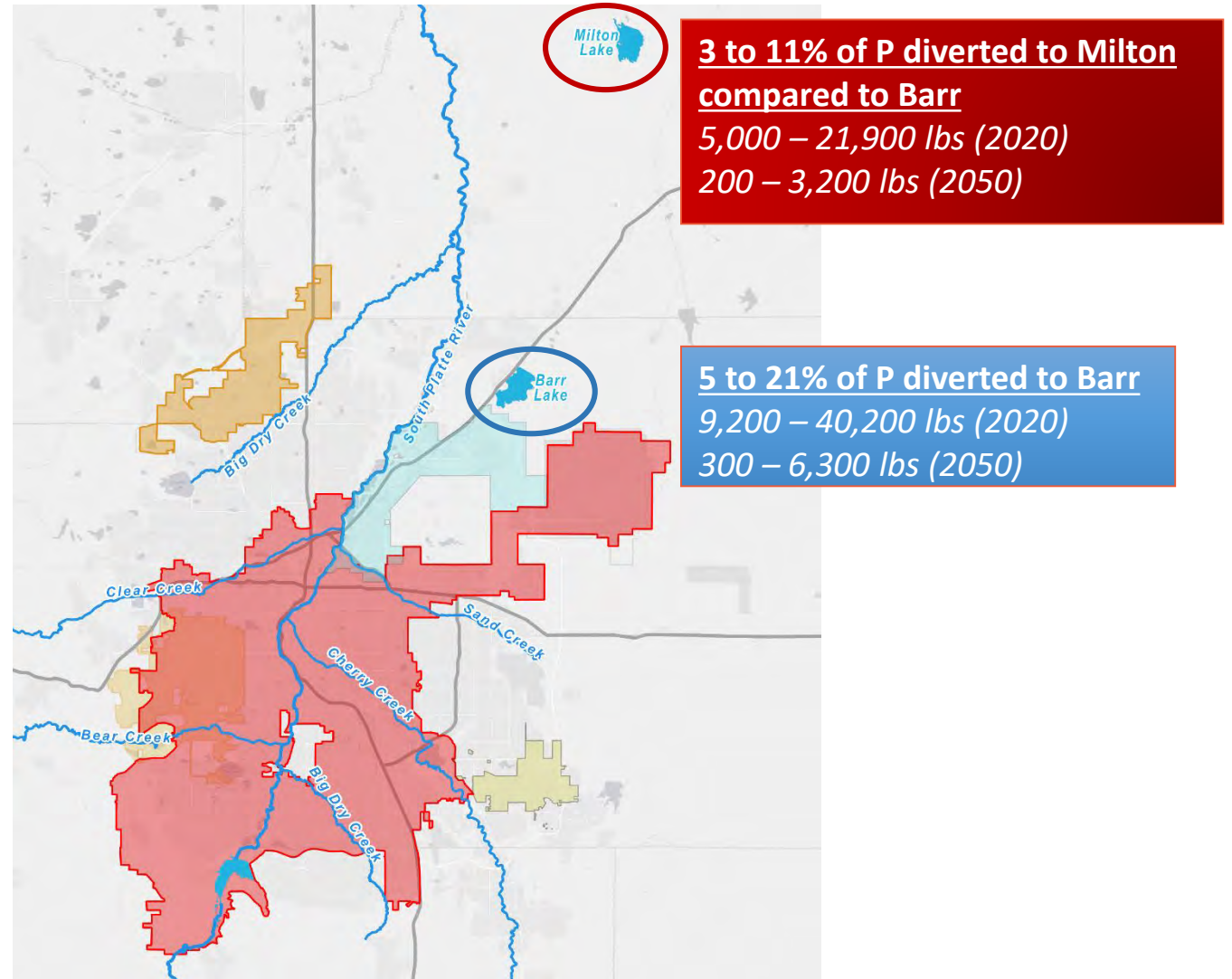
2050 Conceptual Watershed Phosphorus Loading Increase Loading in lbs/year (low and high estimates) at 2 mg/L as PO₄



OCCT P Contributions to Barr and Milton

2020 = (60% to 289%
of target loads
for TMDL)

2050 = (5% to 80% of
target loads
for TMDL)



Loading Analysis

Many, many assumptions

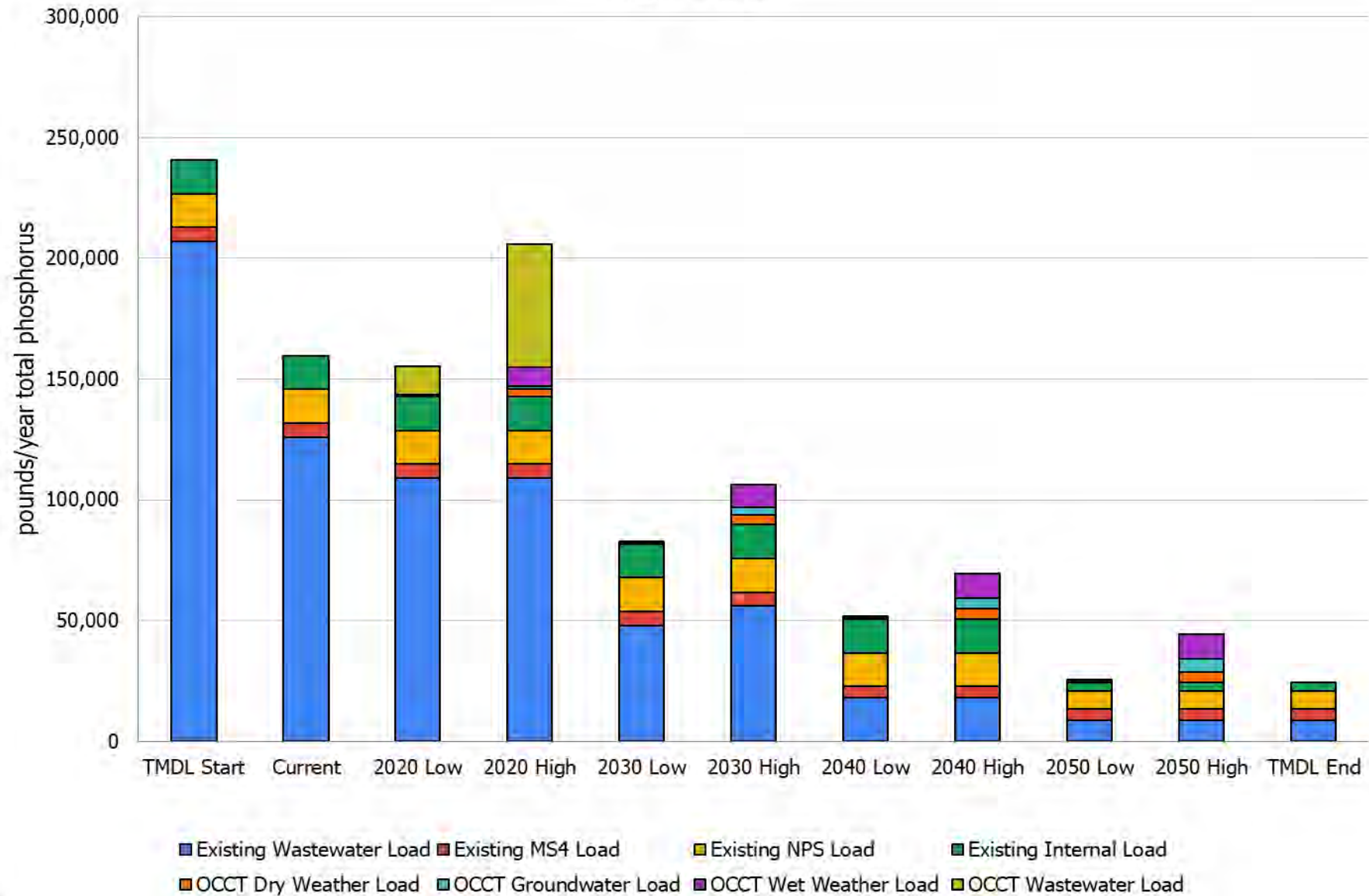
@ 2 mg/L ortho-P dose

337,000 lbs P added to watershed

- Combination of Dry weather runoff, wet weather runoff, groundwater return, wastewater return, soil zone accumulation, yard waste, biosolids

| Summary Information | | 2020 | | 2050 | |
|---|----|--------------|---------------|--------------|---------------|
| | | Low Estimate | High Estimate | Low Estimate | High Estimate |
| Total Watershed Load | lb | 337,000 | 337,000 | 425,000 | 425,000 |
| Dry Weather Runoff | lb | 3,000 | 10,000 | 3,000 | 13,000 |
| Wet Weather Runoff | lb | 7,000 | 24,000 | 9,000 | 31,000 |
| Groundwater Return | lb | 0 | 3,000 | 1,000 | 17,000 |
| Wastewater Return to Watershed | lb | 158,000 | 158,000 | 0 | 0 |
| Amount Retained in Soil Accumulation Zone | lb | 95,000 | 75,000 | 119,000 | 83,000 |
| Amount Removed from Watershed (yard waste) | lb | 32,000 | 25,000 | 40,000 | 28,000 |
| Amount Removed in Biosolids | lb | 32,000 | 32,000 | 240,000 | 240,000 |
| Unaccounted For P (e.g. indoor use not going to WW) | lb | 10,000 | 10,000 | 13,000 | 13,000 |

Figure 2.3



Outcomes

Variance Approved by USEPA 12.16.19



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8

1595 Wynkoop Street
Denver, CO 80202-1129
Phone 800-227-8917
www.epa.gov/region08

DEC 16 2019

Ref: 8WD

Mr. Jim Lochhead
CEO/Manager
Denver Water
1600 West 12th Ave.
Denver, Colorado 80204

Re: Denver Water's Request for a Variance from the Optimal Corrosion Control Treatment Requirements under the Safe Drinking Water Act's Lead and Copper Rule

Dear Mr. Lochhead:

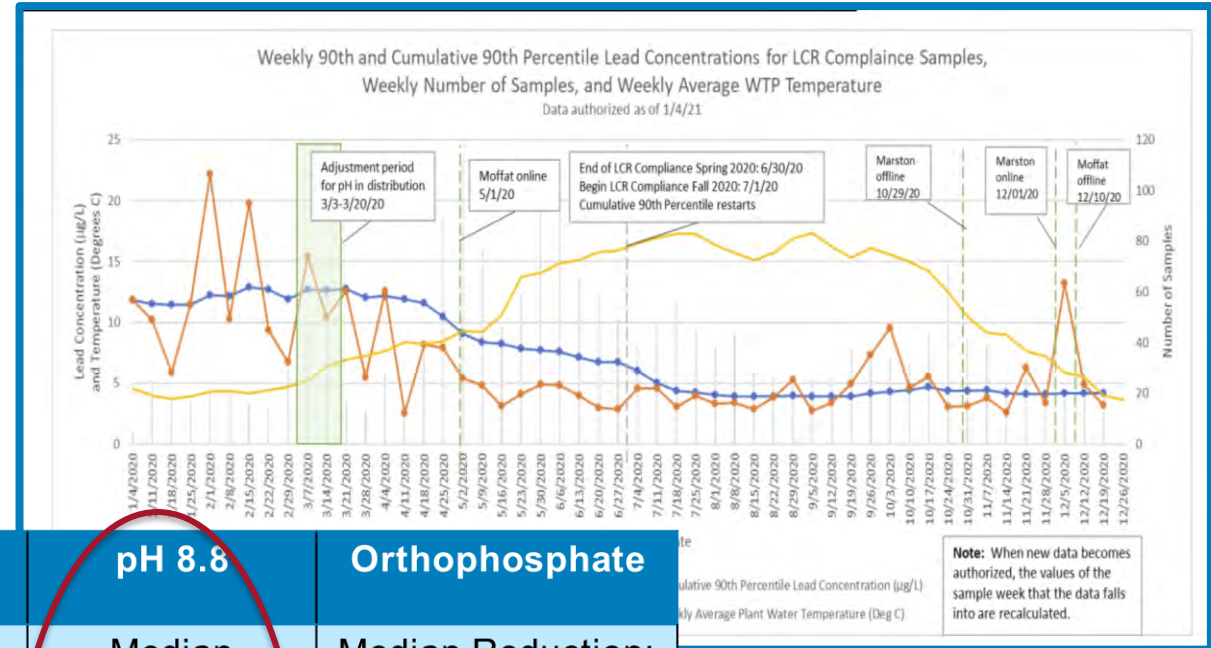
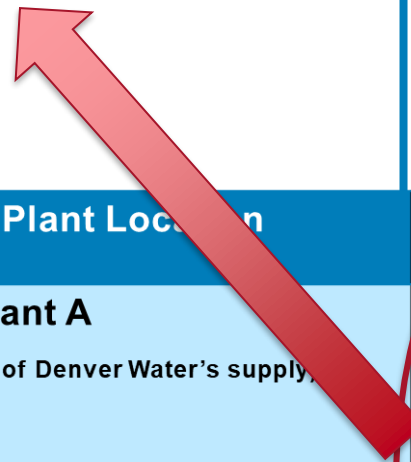
The U.S. Environmental Protection Agency has reviewed your September 6, 2019 request for a variance from the Safe Drinking Water Act (SDWA) related to the optimal corrosion control treatment requirements of the Lead and Copper Rule (LCR). Under Section 1415(a)(3) of the SDWA, the EPA has authority to grant a variance from any treatment technique requirement upon a showing that an alternative is "at least as efficient in lowering the level of the contaminant." Pursuant to that authority, the EPA finds that Denver Water's proposed Lead Reduction Program Plan (LRPP) is sufficient to qualify for a short-term variance because it is expected to provide public health protection and at least as equivalent lead reductions as compared to compliance with the LCR provisions regarding corrosion control. EPA hereby grants the variance from the definition of "optimal corrosion control treatment" in 40 C.F.R. 141.2. EPA approves the variance for an initial three-year period to give Denver Water the opportunity to demonstrate the LRPP will effectively reduce lead in drinking water over the 15-year period they have requested.

Change in pH – Treatment Plants



2020 Lead Reduction Results

64% Reduction
in Lead Levels!



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|---|----------------------------------|---|
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Note: When new data becomes authorized, the values of the sample week that the data falls into are recalculated.

LEAD REDUCTION PROGRAM

KEY METRICS

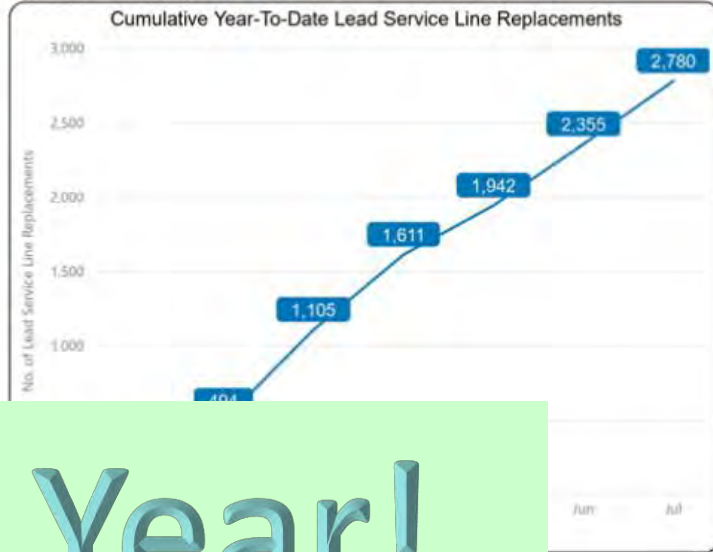
Report Period 1/1/2021 to 7/31/2021



**includes water quality testing, potholing and records analysis to confirm service line material.

Corrosion Control Treatment (pH Adjustment)

| Location | pH ≥ 8.5 |
|---------------------------------|----------|
| Distribution System | Yes |
| Moffat Water Treatment Plant | Yes |
| Marston Water Treatment Plant | Yes |
| Foothills Water Treatment Plant | Yes |



Program Milestones

| Milestone | Milestone Description |
|-----------|--|
| 2Q 2021 | Continue targeted neighborhood outreach |
| 2Q 2021 | Distribute additional water tests to inform program tools and planning |
| 2Q 2021 | Lau |
| 3Q 2021 | Cor |
| 3Q 2021 | Filt |
| 3Q 2021 | Hor |
| 3Q 2021 | Sta |

Solid 2nd Year!



In Closing.....

What happens when the lights go out in Las Vegas?

- How do we solve the impending water crises that are coming/here?
- TOGETHER
- The OCCT experience can serve as a model of how to hang together so we don't hang separately.

