

DNR – Drinking Water and Groundwater Study Group Meeting

January 14, 2021





Phosphate Addition to Drinking Water and Impacts to Wastewater Treatment Facilities

Cathy Wunderlich – Chief, Public Water Engineering Section &
Andrew Dutcher – Water Quality Program, Wastewater Engineer





Outline

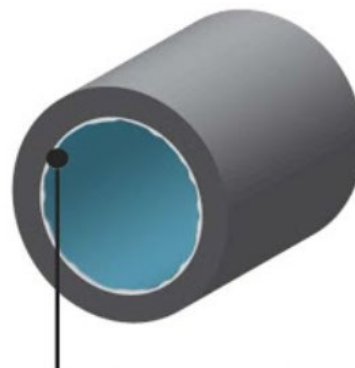
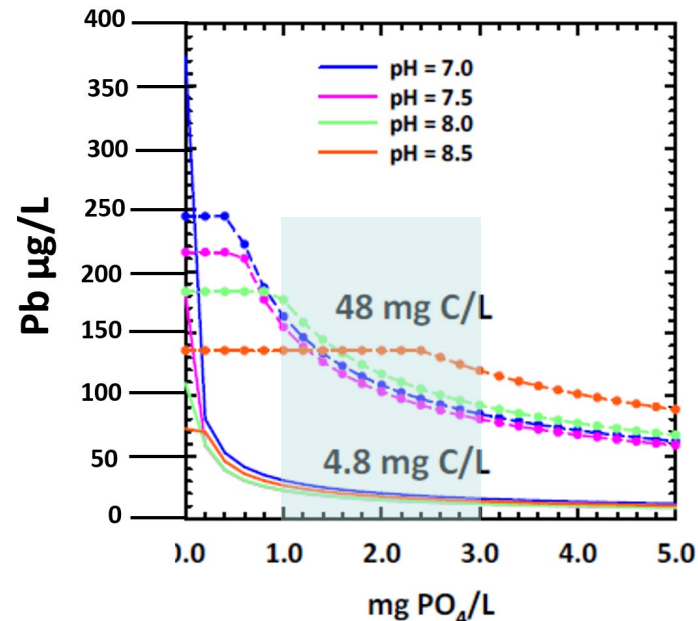
- Corrosion Control Treatment Options
- Phosphorus Discharge Regulations
- Phosphorus Treatment Options
- Implications of Phosphorus from Corrosion Control Treatment
- Treatment Strategies for increased Total Phosphorus Loading



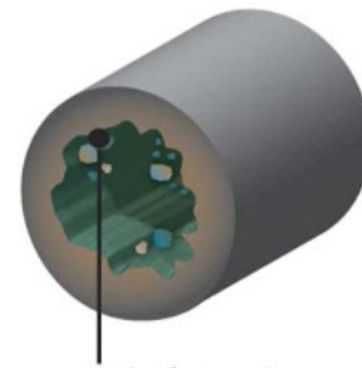
Corrosion Control Treatment Options

KEY WATER QUALITY PARAMETERS

- pH
- Alkalinity/DIC
- Chlorine
- Inhibitor residuals
- Chloride
- Sulfate
- Conductivity
- Temperature



A protective layer of *Orthophosphate* forms to prevent pipe corrosion.



Lack of corrosion control allows lead to leach from pipes into water.





Phosphorus Discharge Regulation

- Before 2010, 1 mg/L technology-based limit for large municipal dischargers (>150 lb P/d, roughly 10,000 people)
- 2010: total phosphorus (TP) surface water quality standards
 - Lakes: 5 µg/L (Lake Superior) to 40 µg/L (non-stratified lakes)
 - Rivers and Streams: 75 µg/L (streams) to 100 µg/L (certain rivers)
- Many waters found to exceed water quality standards
- 2017: Statewide multi-discharger phosphorus variance

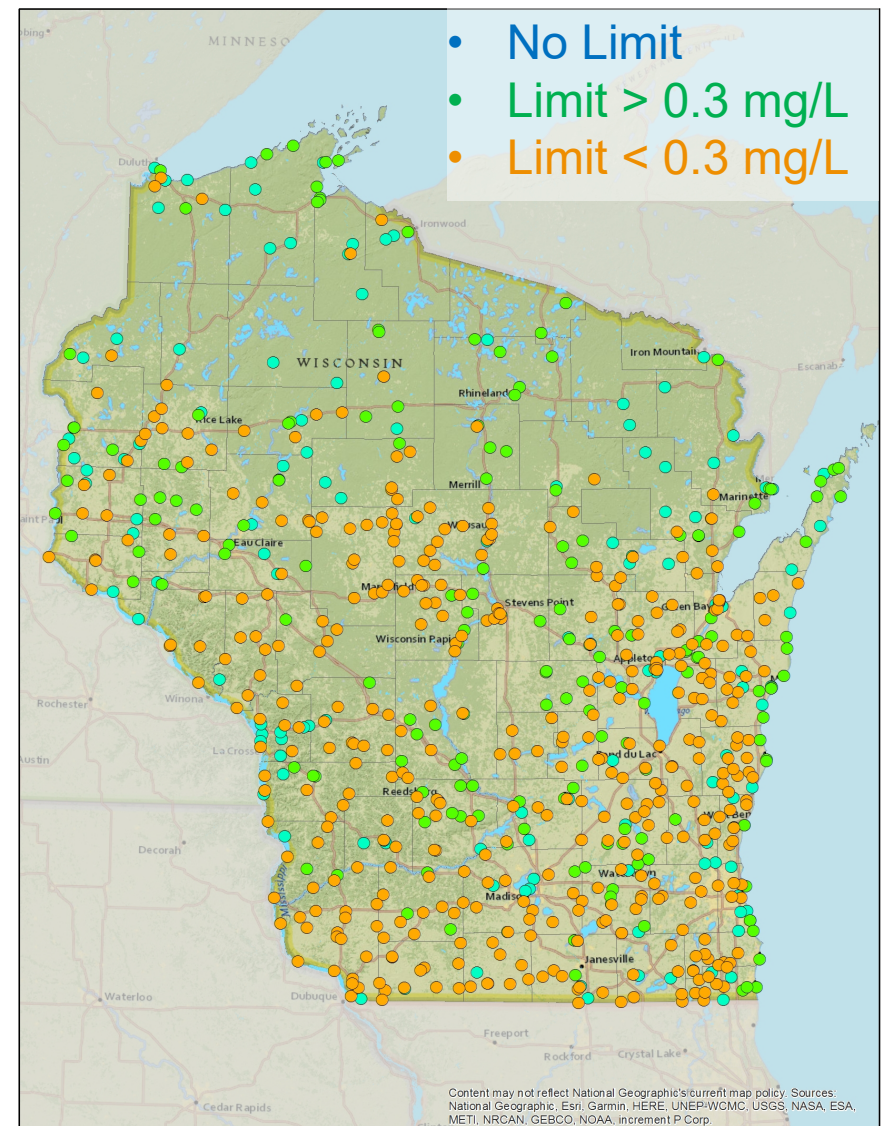
Eligible facilities:

- Would need major upgrade beyond conventional biological phosphorus removal or chemical phosphorus removal
- Upgrade would cause user rates > 1% MHI
- County economic indicators suggest that the upgrade would have widespread impact
- Need to meet ~0.5 mg/L to 1 mg/L TP limit
- Up to 20 years



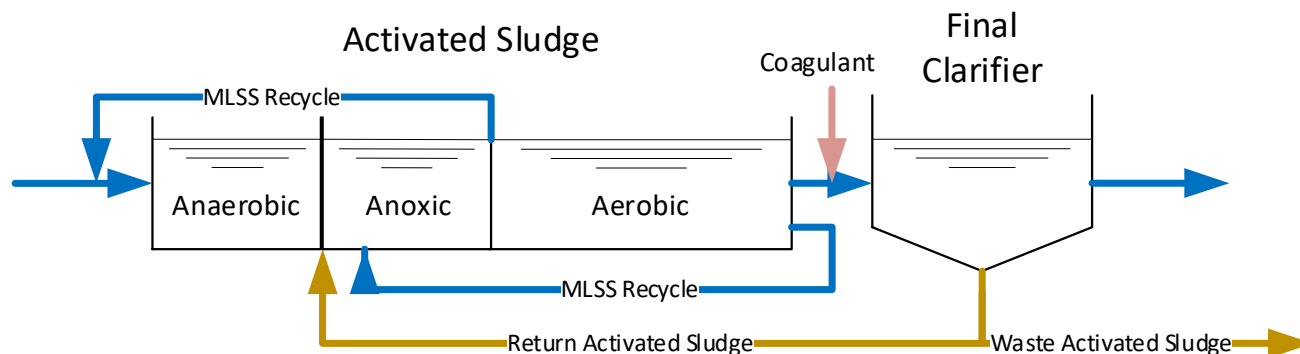
Phosphorus Discharge Regulation

- 82% of WWTFs in Wisconsin have a TP limit (higher % for muni's)
- Majority of facilities with TP treatment have chemical phosphorus removal (CPR)
- Many facilities have final or variance limit >0.3 mg/L



Phosphorus Treatment Options

- None: Phosphorus uptake for cell growth, but ratio of carbon:nitrogen:phosphorus leaves an excess of phosphorus
- (Enhanced) Biological Phosphorus Removal (BioP, BPR, or EBPR): Cycling of microbes between varied environments within activated sludge process causes cells to store excess phosphorus. Effluent 0.5 mg TP/L
- Chemical phosphorus removal (CPR): metal coagulant fed to coagulate/precipitate P. Cells serve as anionic flocculant. Effluent 0.3 mg TP/L





Technical review: TP Fractions

Phosphorus





Technical review: TP Fractions

Phosphorus

Insoluble or
Particulate





Technical review: TP Fractions

Phosphorus

Insoluble or
Particulate

Soluble





Technical review: TP Fractions

Phosphorus

Insoluble or
Particulate

Soluble

Non-reactive
(includes poly-P)





Technical review: TP Fractions

Phosphorus

Insoluble or
Particulate

Soluble

Non-reactive
(includes poly-P)

Reactive
(Ortho-P)





Implications of Phosphorus from CCT

- Increased load of P at WWTF. Expect average increase of 50% of TP dose (ortho-P + poly-P)
- Ortho-P easier to treat (fully reactive), regardless of P removal at WWTF
- Poly-P more difficult to remove, though second on the list (BPR) when ortho-P is depleted
- Most WWTFs can handle a modest increase in TP loading without substantive increase in effluent TP
- P for corrosion control is not a required source reduction measure under a variance unless excessive or there is an effective corrosion control alternative





Treatment Strategies for Increased TP Loading

- CPR: Increase coagulant dose. Possibly moderate effluent TP increase from poly-P
- BPR
 - May need additional carbon (influent BOD or solids fermentation-put anaerobic zone mixers on timers) to offset additional P load
 - Chemical trim at end of biological process
- No treatment: could trigger limits in future, but varies depending on size of discharger, receiving water body





Summary

- Minimize poly-P, since it does not address corrosion control and is harder to remove at WWTF
- Optimize ortho-P, since it is the active corrosion control chemical and is easier to remove at WWTF
- Increased influent P typically will not impact achievable WWTF effluent quality
- Increased influent P typically will increase O&M costs (coagulant)





The In's and Out's of the Denver Variance

A-Mile-High Achievement

Brendon Peppard – Public Water Corrosion Control Engineer





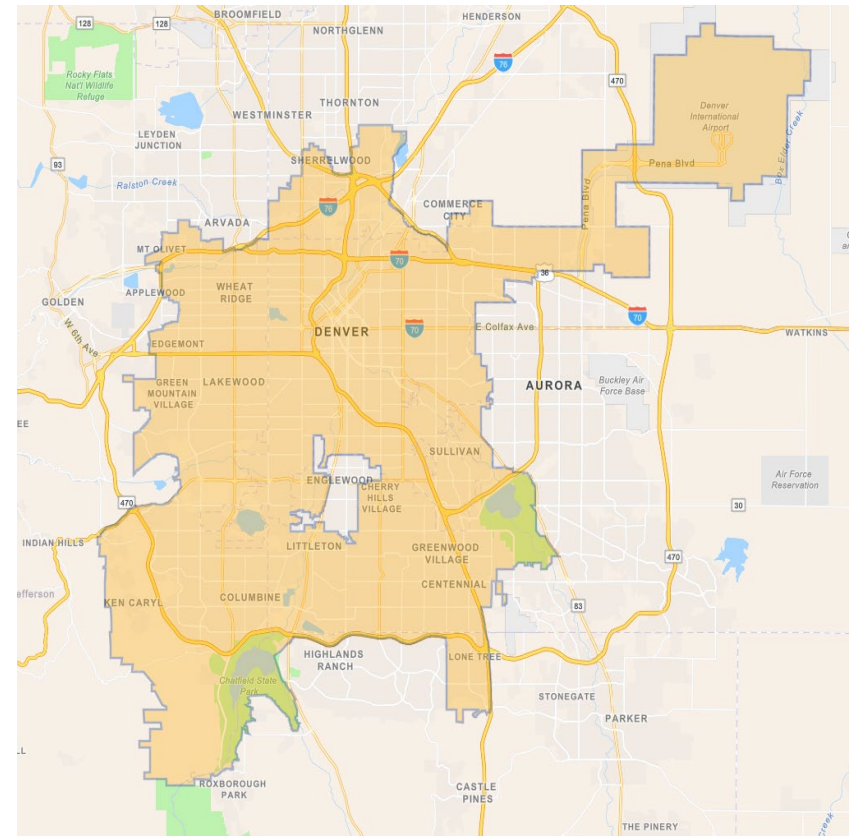
Overview

- Denver's Demographics
- Denver's Lead and Copper History
- Corrosion Control Studies
- EPA Variance Request and Requirements
- Financial Aspects
- Progress to Date



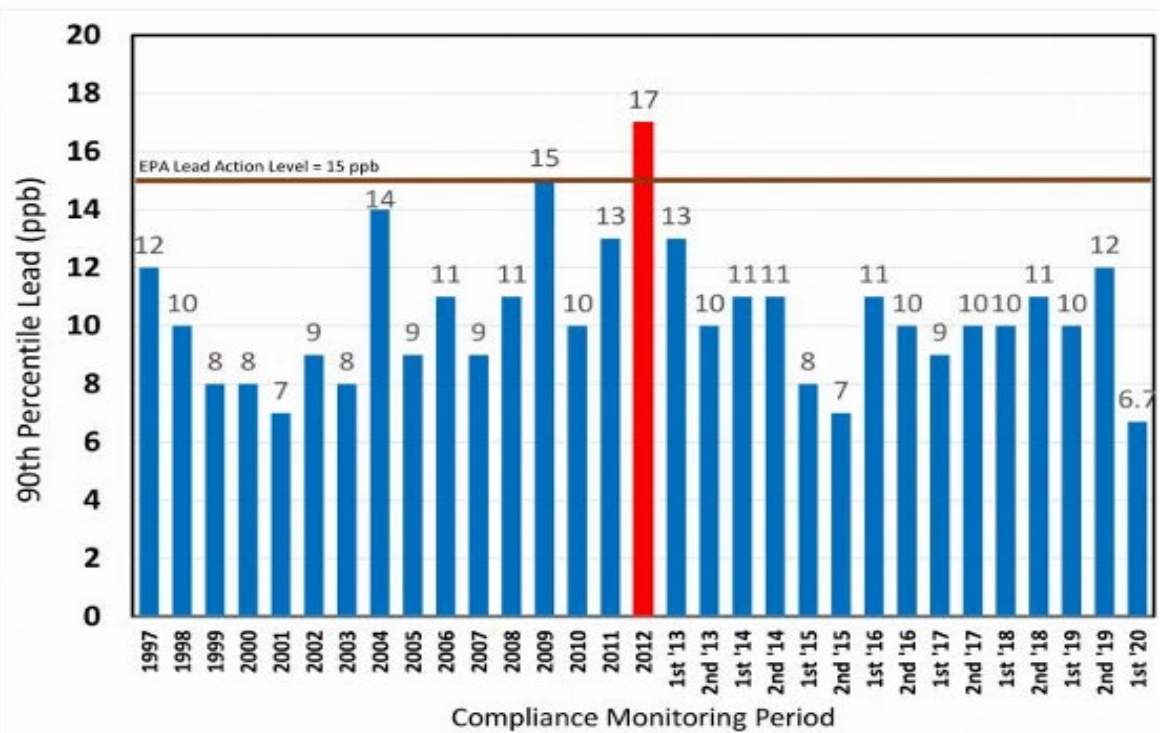
Denver Demographics

- Denver Water established in 1918
 - Milwaukee = 1871
- 64,000 to 84,000 lead service lines (LSLs)
 - Milwaukee = 74,400 LSLs
- Serves Population of about 1.5 million
 - Greater Milwaukee = 882,500
- Service area covers more than 335 square miles.
 - Greater Milwaukee = 196 square miles



Denver Lead and Copper History

- Denver banned the installation of lead service lines in 1971.
- 1994 Denver started using pH adjustment.
 - pH 7.8
- In 2012 an ALE triggered the system to complete a corrosion control study.





Corrosion Control Treatment Study

A series of studies compared pH and alkalinity adjustment, silicates, and orthophosphate as treatment options. The studies deemed orthophosphate as the most effective form of corrosion control.





Findings

Orthophosphate [mg/L]	3.0	2.0	1.0	0.5
Results	Most effective	Somewhat effective	Not effective	Not effective
Done at pH 7.8				

pH	7.8	8.8	9.2
Results	Control	Lead reduced	Lead increase



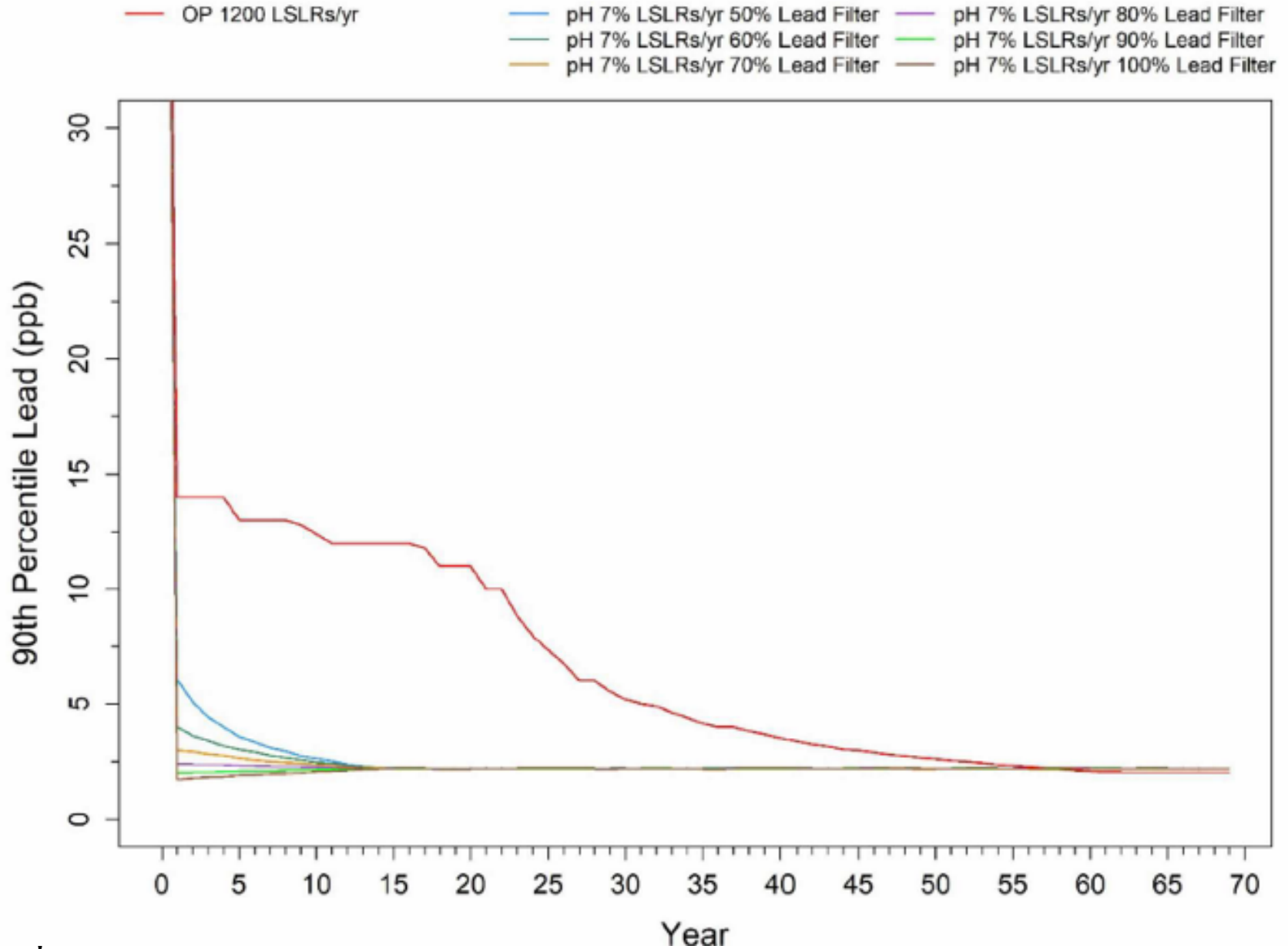


Alternative Treatment Request

The Safe Drinking Water Act Section 1415(a)(3) gives EPA the authority to issue a variance from a treatment technique requirement upon showing that an alternative is “at least as efficient in lowering the level of the contaminant with respect to which such requirement was prescribed.”



Figure 1: Projected Lead Concentrations (90th Percentile) Comparing Orthophosphate to Denver Water's Proposed Variance Approach





Variance Requirements

1. pH adjustment to 8.8 (instead of phosphate)
2. LSL inventory
3. Full LSL replacement in 15 years (>4000 LSLs/Year)
4. Provide lead removal water filters to all homes with known, suspected, or possible LSLs.
5. Extensive public outreach and communication with a health equity and environmental justice focus.





Financial Aspects

- No direct cost to individual customer.
 - Costs of the replacement program would be recuperated through water rates paid by all customers, as well as loans, grants, donations, and a commitment of \$22.5 million in funding from the Metro Wastewater Reclamation District.
- The program is currently estimated to cost between \$304 million and \$556 million for the 15-year program.



Progress



LEAD REDUCTION PROGRAM

KEY METRICS

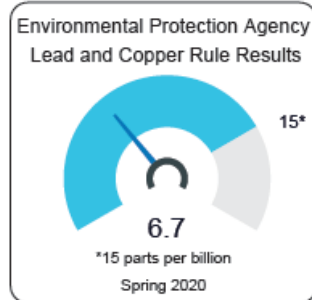
Report Period 1/1/2020 to 11/30/2020



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

Corrosion Control Treatment (pH Adjustment)

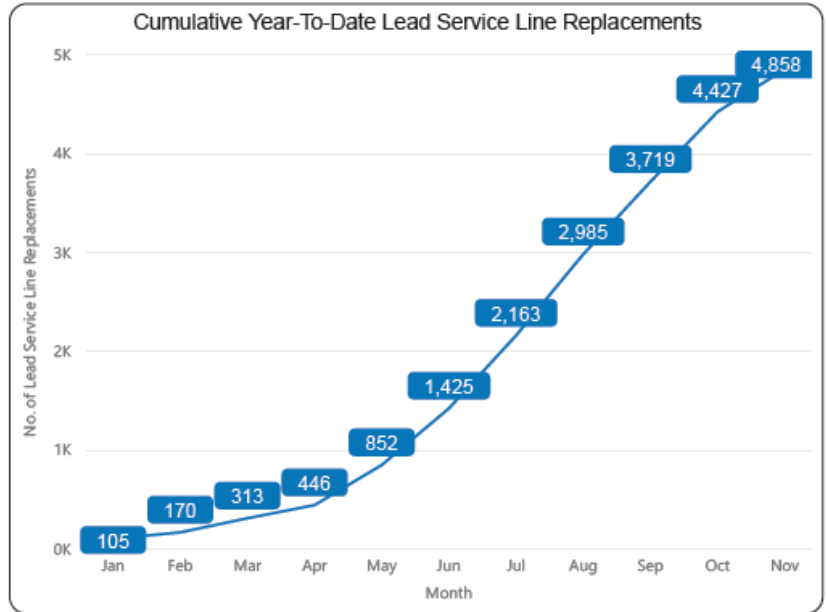
Location	pH ≥ 8.5
Distribution System	Yes
Moffat Water Treatment Plant	Yes
Marston Water Treatment Plant	Yes
Foothills Water Treatment Plant	Yes



Communications, Outreach and Education Activity

- 38 Events
- 10,668 Event Attendees
- 5M Mailing, Digital & Phone Outreach*

(*Digital Data Reported Quarterly)



Program Milestones

Milestone	Milestone Description
2Q 2020	Lead line replacement notifications and consent form packets mailed
2Q 2020	Filter use reminder postcard mailed
2Q 2020	Launched virtual public meetings
3Q 2020	Launch 1983-1987 homes outreach
3Q 2020	Replacement filter distribution begins
4Q 2020	2021 work areas identified
4Q 2020	Filter adoption survey mailed

Questions?





SDWLP Private Lead Service Line Replacement Program

Cathy Wunderlich – Chief, Public Water Engineering Section





Private LSL Replacement Program

Total Amount Available: >\$64 million

	PERFs Received	Applications Received	LSLSs to be replaced	Average Cost/ LSL¹	Total Requested²
To Date	66	35	5,943	\$4,234	\$24,016,618
Anticipated for CY 2021	66	66	7,629	TBD	\$33,879,842

¹Engineering and legal fees for mandatory ordinance are not included in this average

<https://dnr.wisconsin.gov/aid/documents/EIF/privateLSLreplacementFundingProgram.html>



Private LSL Replacement Program

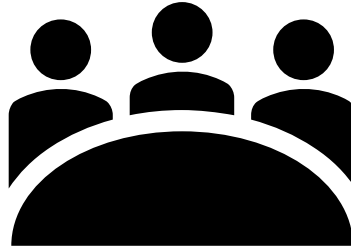
Utility	Estimated Lines Replaced in a Year	Estimated Average Cost	Calculated Request
Milwaukee City	1000	\$6,128	\$4,085,333
Stoughton City	749	\$5,000	\$3,745,000
Kenosha City	335	\$6,000	\$2,010,000
Janesville City	314	\$6,000	\$1,884,000
Manitowoc City	500	\$3,500	\$1,500,000
Green Bay City	300	\$4,500	\$1,350,000
Menomonee Falls Village	200	\$6,000	\$1,200,000
Shawano City	200	\$4,500	\$900,000
Eau Claire City	326	\$2,450	\$798,700
West Allis City	175	\$4,800	\$665,000
Sheboygan City	100	\$6,590	\$659,000
Watertown City	100	\$5,000	\$500,000

https://dnr.wi.gov/Aid/documents/EIF/news/LSL_CY2021_PPL.pdf





Member Roundtable



Scott Laeser, Clean Wisconsin

Chris Groh, Wisconsin Rural Water Association

David Webb, Wisconsin State Laboratory of Hygiene

David Kelter, American Water Works Association (AWWA) - Wisconsin Chapter

Lawrie Kobza, Municipal Environmental Group

Paul Junio, Northern Lake Service

Jeff Kramer, Wisconsin Water Well Association

Roy Irving, Department of Health Services

Rick Wietersen, Wisconsin Association of Local Health Departments and Boards

Craig Summerfield, Wisconsin Manufacturers and Commerce





Environmental Enforcement

Sadie Derouin – Environmental Enforcement Specialist



Wisconsin DNR Drinking Water & Groundwater Program



Online Capacity Development Training Update

Cathy Wunderlich – Public Water Engineering Section Chief



Wisconsin DNR Drinking Water & Groundwater Program

Online Capacity Development Training



WISCONSIN'S CAPACITY DEVELOPMENT PROGRAM

The Capacity Development Program aims to help public water systems strengthen their ability to consistently supply safe drinking water to their customers. The program focuses on assisting small water systems, with improving their technical abilities, managerial skills, and meeting the Safe Drinking Water Act (SDWA) requirements.

CAPACITY DEVELOPMENT IN WISCONSIN

- [Wisconsin's Capacity Development Program for New Public Water Systems](#)
- [2018-2020 Report to the Governor \(DG-071\)](#) [pdf]
- [Wisconsin's Capacity Development Strategy Fact Sheet \(DG-063\)](#) [pdf]
- [Wisconsin's Capacity Development Strategy Full Report](#) [pdf]

Wisconsin's capacity development program began on September 1, 1999. As public water systems conduct an evaluation of their system capacity. Capacity evaluation is required for all public water systems:

- **Municipal Community (MC) systems** - municipal systems are owned by cities, villages, and townships and regularly serve at least 25 year-round residents;
- **Other than Municipal Community (OTM) systems** - OTM systems serve groups of people and can include mobile home parks, apartments, and condominiums; and



Wisconsin DNR Drinking Water



HOW TO SUBMIT CAPACITY EVALUATION FORMS

- Systems subject to DNR plan review (all OTM systems, and NN systems with pumping capacity equal to or greater than 70 gallons/minute): The capacity evaluation is completed as part of the plan review process. Submit the appropriate capacity evaluation form with the plan review information. Once the plan approval is granted and the capacity evaluation is reviewed, the DNR will send an approval letter and capacity certification to the system owner.
- Systems **not** subject to DNR plan review (all NN systems with pumping capacity less than 70 gallons/minute): The capacity evaluation is still required prior to system construction. Owners should complete and send the capacity evaluation form to the DNR. The DNR will review the capacity evaluation and send a letter of approval and capacity certification to the system owner.

Send capacity evaluation forms to:

Capacity Development Coordinator
Wisconsin Department of Natural Resources
2300 North Dr Martin Luther King Jr Drive
Milwaukee WI 53212-3128

RELATED LINKS

- [Asset management for public drinking water systems](#)
- [DNR-sponsored free online training in utility management](#) [exit DNR]

Online Capacity Development Training

MPTC is open to students for classes. Spring classes begin January 25. Register now!

COVID-19
UPDATES

1-800-472-4554 Hours



ACADEMICS ADMISSIONS PAY FOR COLLEGE EXPERIENCE MPTC



WATER UTILITY MANAGEMENT TRAINING

Home > Academics > Continuing Education > Certification and Licensure > Water Utility Management Training



The Wisconsin Department of Natural Resources Bureau for Drinking & Groundwater is offering three (3) online training courses comprised of four (4) unique learning modules for water utility governing bodies and for drinking water utilities professional staff who have decision making authority. These online modules are management trainings intended for government bodies (village, city

As Coronavirus has impacted all our lives, Moraine Park Technical College has rapidly responded in a number of ways, one of which is to temporarily move our training courses online. For our participants who have minimal experience taking an online training course, we understand that it may be overwhelming. Moraine Park is dedicated to providing a high-quality education; we are here to help you succeed. Most importantly, Moraine Park wants our participants to have the best user experience possible, feeling

To ensure continuous delivery of safe drinking water to their customers, the public water systems must also demonstrate during sanitary survey inspections that they have and will continue to maintain TMF capacity. These inspections are conducted by the DNR on a scheduled timeline and are required of all public water systems. The purpose of the training provided through this project is to educate the governing bodies of water utilities on how to effectively manage their utility's programs, assets, and finances.

<https://www.morainepark.edu/academics/continuing-education/licensure-and-certificates/water-utility-management-training/>

education; we are here to help you succeed. Most importantly, Moraine Park wants our participants to have the best user experience possible, feeling comfortable and confident while navigating our online training courses.

If in the event a module navigational issue, or technical problem is to occur during an interactive training course, we want you, the participant to feel comfortable knowing we're only a phone call (or email) away and always happy to help.

Please feel free to reach out if you have any questions,

Jason Ellis
EWD – Water Quality Instructor

jellis3@morainepark.edu
920-924-3418 (8:00 am – 4:00 pm CST)



Interested in this free training? Please provide your email below. Please note that we will not share your email address with anyone.



Email *



Wisconsin DNR



Online Capacity Development Training



Enroll in Water Utility Management Training

You are enrolling in **Water Utility Management Training**.

Please enter your Email:

Email

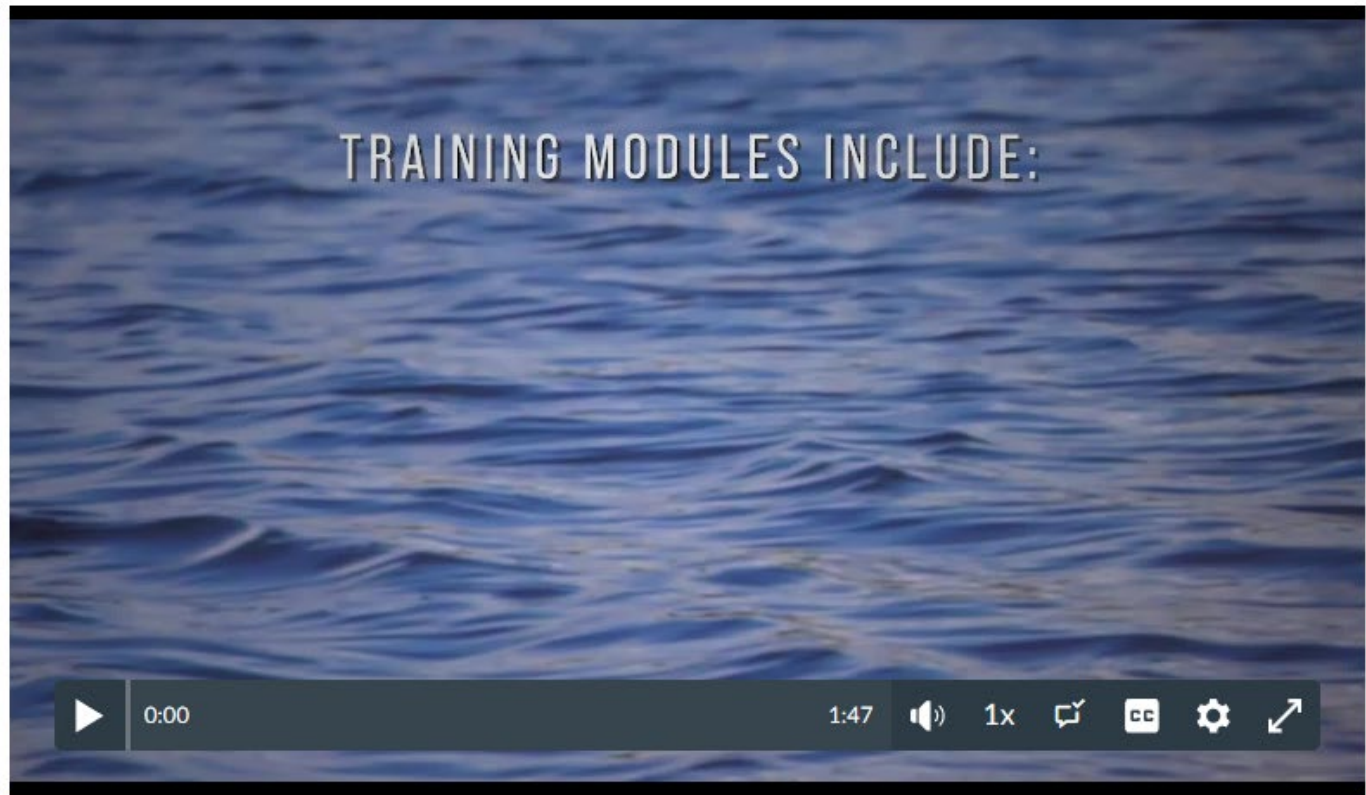
- I am a new user
- I already have a MPTC login

[View Privacy Policy](#)



Water Utility Management Training

Welcome to the Wisconsin DNR Water Utility Management Training!





Online Capacity Development Training

Wisconsin DNR regulates over 600 municipal water systems that are eligible for Safe Drinking Water Loan Program (SDWLP) funding. In order to incentivize these training modules, 10 points will be granted under the DNR Intended Use Plan, Section IV (System and Consolidated System Capacity Points) of the PERF, if at least 50 percent of the members of the water utility's governing body have taken all of the training modules available at the time of application. These points will be available starting in SFY 2022. Training must be completed and certified online by June 30 of each year in conjunction with a SDWLP application. These trainings also serve as a useful tool to improve any utility governing body's management, communication, planning, budgeting, water system partnering, and utility asset management, regardless of whether the utility has applied for SDWLP funding or not.

Instructions:

Please **complete the Pre-Course Questions** before you proceed with the Water Utility Management training. Currently, Water Utility Management - Part A and Water Utility Management - Part B are available to take. Water Utility Asset Management will be available in July 2021 and Water Utility Financial Management will be available January 2022.

Please click the links below to navigate to the course. Again, please note that you must complete the Pre-Course Questions before you are able to complete Part A.

[Pre-Course Questions](#)

[Water Utility Management - Part A](#)

[Water Utility Management - Part B](#)





PFAS Sampling Plan Update

Kyle Burton – Director of Field Operations





PFAS Sampling Plan Update

➤ **Why Sample for PFAS Now?**

- Gather information, including on economic impact of proposed maximum contaminant levels (MCLs)
- Public health impacts
- Wisconsin's PFAS Action Council recommended testing of municipal systems





PFAS Sampling Plan Update

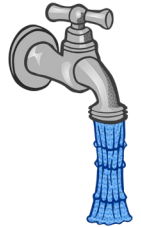
➤ **STEP 1**

➤ **Targeted Sampling Pool:**

➤ Municipal Systems

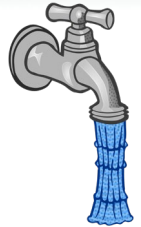
- Proximity to potential releases related to AFFF such as military installations, Fire Training Sites, and Airports
- Wells located near concentrated industrial areas where PFAS compounds may have been used or produced

➤ **Expect initial list expected to be 75-100 Municipal Systems**





PFAS Sampling Plan Update



➤ **Step 2**

➤ **Build Partnerships**

- State Lab of Hygiene
 - Sampling Protocol and schedule

- WI Department of Health (DHS)
 - Risk communication

- Sister DNR Programs
 - Remediation and Redevelopment
 - Wastewater





PFAS Sampling Plan Update

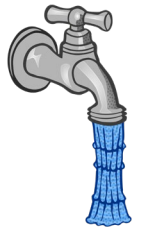
➤ **Step 3**

➤ **Communications**

- Stakeholder Outreach

- System Outreach
 - Project overview
 - Training

- Website
 - Tools for systems
 - Education for consumers
 - Sample results





PFAS Sampling Plan Update

➤ **Step 4**

➤ **Implementation**

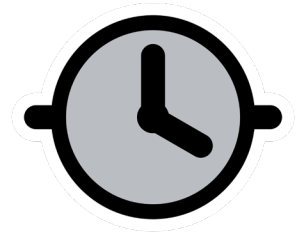
- Sample Scheduling and Kit Delivery
- Sample collection and analysis
- Communication of results





PFAS Sampling Plan Update

➤ ***Timeline***



➤ **System Selection**

- Ongoing: expected completion ***January 2021***

➤ **Building Partnerships**

- Ongoing: Actively engaged with WSLH, DHS, RR, and WW

➤ **Communication**

- Ongoing: Stakeholder Outreach
- Upcoming: System Communication and Website – ***February - March 2021***



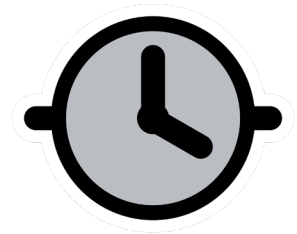


PFAS Sampling Plan Update

➤ ***Timeline cont...***

➤ **Implementation**

➤ *April - October 2021*



QUESTIONS





Internal Updates



Kyle Burton—Director of Field Operations



Lead & Copper Update



➤ **2020 Municipal Sampling**

➤ *~600 Municipal Systems attained MSP approval*

➤ *14 Systems did not = Notice of Non-Compliance and resample in 2021*

➤ *Increased Action Level Exceedences (ALE) at small and medium systems*

➤ *Currently reviewing WQP information collected*

➤ *Operational recommendations and additional sampling*



Lead & Copper Update



➤ **2021 Other than Municipal (OTM) MSP update project**

- *OTM systems in Wisconsin do not have a documented materials inventory in relation to the presence of lead and copper in their distribution system.*
- *Lack of this information may result in system not sampling at appropriate sites.*
- *As a result, we may not be providing the best public health protection possible.*
- *Partnering with WI Rural Water to update MSP*



Lead & Copper Update



➤ ***Lead and Copper Rule Revisions***

➤ ***Signed December 22, 2020***

- *WI DNR reviewing revisions*
- *Implementation will Require Rule Making Process*
- *Formation of stakeholder/input group*
- *EPA Summary of revisions*

https://www.epa.gov/sites/production/files/2020-12/documents/lcr_overview_fact_sheet_12-21-2020_final.pdf



Manganese Sampling Update

- Secondary MCL in state, federal codes (50 $\mu\text{g}/\text{L}$)
- Select systems monitored under UCMR4 in 2019
- In Wisconsin, systems sample once/9 years
- Taste/color are issues if concentrations \geq (50 $\mu\text{g}/\text{L}$)





Manganese Sampling Update

- A small number of public water systems in Wisconsin have elevated concentrations
- Roughly 50+ systems

When is it a health concern?

- US EPA and Department of Health Services Health Advisory Levels (HALs)
 - 300 $\mu\text{g/L}$ risk to infants 6 months and younger and anyone 50 and older
 - 1000 $\mu\text{g/L}$ risk to all consumers





Manganese Sampling Update

Plan for working with PWS

- Review sampling history ✓
- Identify PWS for more monitoring ✓
- Developing website ✓
- Initial and Check Sampling - *Ongoing*
- Require PN if Mn \geq HALs - *Ongoing*





Status of Mn Sampling

- 68 PWS required to sample based on past sampling results

	Municipal	Other- than- Municipal	Non-transient Non- Community	Total
Northern Region	16	6	7	29
West Central Region	6	4	19	29
South Central Region	1	1	2	4
Northeast Region	3			3
Southeast Region		1	2	3
Grand Total	26	12	30	68



Mn Results and Public Notices

Range of Check and Compliance samples: 0 $\mu\text{g/L}$ to > 6000 $\mu\text{g/L}$	
0 to 50 $\mu\text{g/L}$	19
50 to 100	6
100 to 200	7
200 to 250	11
250 to 300	10
300 to 1000	37
>1000	13
Total samples	103

>1000 $\mu\text{g/L}$ PN	MC PWS	NN PWS
Northern Region	2	
West Central Region		3

>300 $\mu\text{g/L}$ PN	MC PWS	OTM PWS	NN PWS
Northern	4		1
West Central		2	3

Total PNs issued: 15





Mn Public Notice and Monitoring Requirements

- PNs updated with new monitoring results
- Systems with samples $> 300 \mu\text{g/L}$ placed on quarterly monitoring
- Rescind PN based on Running Annual Average





Rules Update

➤ **NR140 and NR809**

➤ Cycle 10 (PFOA and PFOS)



↓

➤ Cycle 11 (Additional PFAS)

- Initial Scope Statements to NRB in Feb 2021
- Public Hearings in early March





Rules Update

- **NR811** – *Requirements for the operation and Design of Community Water Systems*
 - Needed updates
 - New design standards/technologies
 - Scope statement approved by DNR Secretary, being reviewed by Governor's Office





Rules Update

- **NR114/146/524** – *Allow third party administration of operator exams*
 - Make exams more readily available in online format
 - Increased cost
 - Preliminary hearing on February 5





Rules Update

- **NR812** – *PVC casing in bedrock*
 - Study Group has finalized recommendations
 - Development of Economic Impact Analysis (EIA)
 - Public input on EIA and draft rule language later this year
- <https://dnr.wisconsin.gov/topic/Wells/PVCStudyGroup.html>





Well Drilling Notifications

- **Seeking improvements in online purchasing platform**

- Survey to well drillers

- Options include staying with “GoWild” or developing new notification portal

- Survey to well drillers via GovDelivery email
1/14/2020



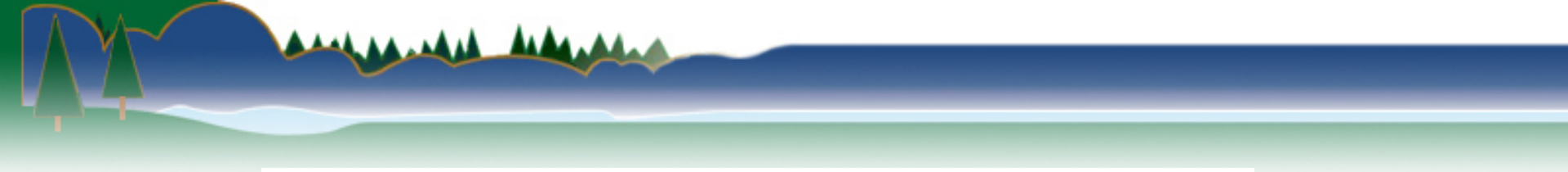


Reminders

- ***Annual cross connection control reports for 2020 are requested by March 1, 2021, per NR 810.15.***

- ***2021 Seasonal Start-Ups***
 - ***Transient Non-Community Systems***
 - ***Online option now available for Contracted Counties***
 - ***Link to Seasonal Start-Up Presentation Slides:***
<https://dnr.wi.gov/topic/DrinkingWater/documents/StudyGroup/Presentation20180405.pdf>







Wrap-up and adjourn

Next Meeting Date: Thursday, March 11
Location: Zoom

Meeting recording will be posted on the
Drinking Water & Groundwater Study Group
website

