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PORTLAND WATER BUREAU: Corrosion Improvement Project Update

Portland City Council March 1, 2017

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Presentation Outline

- Introduction
 - Recap
 - System Overview
 - Lead and Copper Rule (LCR) Overview and Compliance
- Current Status
 - Recent Timeline
 - Water Quality Corrosion Study
- Recommendation
 - Next Steps
 - Treatment Pilot

Decision Tree





Approve contract with Confluence Engineering Group, LLC in the amount of \$664,930 for the Corrosion Control Treatment Pilot Project

System Overview

Service Area and Water Sources



Supply System Overview



Sources of Lead in Portland Where it is *not*



- Not in water supply
- No lead service lines Portland never used lead service lines

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• No lead pigtails - Removed all known lead pigtails



Sources of Lead in Portland Where it *can be*

- Copper pipes and lead solder most common in homes plumbed or built from 1970 - 85
- Home plumbing fixtures installed prior to 1985 can also contribute to lead in water
- In Portland lead paint is the greatest source of exposure to lead



Water System Improvements

- Solder
 - Advocated State ban of lead-based solder in water systems in 1985
- Pigtails
 - Removed all known lead pigtails (>10,000) in the distribution system by 1998 (\$10M)
- Meters
 - Replaced 364 large lead-component meters serving schools, hospitals, childcare facilities, community centers, public housing, and large apartment buildings from 2001-2008.







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Lead and Copper Rule (LCR) Overview and Compliance

Lead and Copper Rule (LCR)



- Published by EPA in 1991
- Requires large utilities (>50,000) to maintain optimal corrosion control treatment (OCCT)

 Requires utilities to conduct lead monitoring at high risk customer taps

•Context: More than 10% of high risk homes tested cannot exceed action level of 15 parts per billion (ppb)

Lead and Copper Rule Compliance



Optimized Treatment Study

1994

- Recommends pH 9.0, alkalinity 20 mg/L as Optimized Corrosion Control Treatment
- City Council directs PWB to investigate alternatives to recommended treatment

1997 City proposes a comprehensive Lead Hazard Reduction Program (LHRP)

1997 State approves LHRP as Optimized Corrosion Control Treatment

1997-presentCity remains in compliance with Lead and Copper Rule

Lead Hazard Reduction Program

- State Approved Compliance Program (1997)
- 4-part program meets federal regulatory requirements

Water Treatment & Monitoring

Education & Testing

Public Education & Community Outreach

Lead Paint Removal Grants









LCR Sampling History

Portland Joint Monitoring 90th Percentile Lead Levels Tier 1 Homes



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Recent Timeline

Recent Timeline

2014	Spring	PWB begins Water Quality Corrosion Study			
2016	April	PWB begins conversations with OHA and EPA			
	Sept. 8	PWB proposes improved corrosion control treatment schedule to OHA			
	Oct. 11	City Council Work Session			
	Nov. 4	OHA approves PWB's proposed schedule and requests interim lead reduction plan			
	Dec. 2	PWB submits interim lead reduction plan to OHA			
2017	Jan. 24	OHA accepts PWB's interim lead reduction plan			
	Feb. 7	PWB raises entry point pH from 8.0 to 8.1			



Water Quality Corrosion Study

Water Quality Corrosion Study

- Authorized by Council in 2014
- Data gathered over entire year to see seasonal variations
- Goal: better understand role of water quality on metals release
- Panel of utility, consultant, and academic experts

DRAFT WATER QUALITY CORROSION STUDY Summary Report

PWB CONTRACT# 30003222

B&V PROJECT NO. 182435



PREPARED FOR

City of Portland, Portland Water Bureau 07 FEBRUARY 2017



Water Quality Corrosion Study

Evaluated 3 corrosion mechanisms in premise plumbing

Uniform Corrosion: influences dissolved lead release

- Biostability (microbial induced corrosion): influences dissolved and particulate lead release
- Scale/transport release: influences particulate lead release



Corrosion Study: What did we test?



Corrosion Study: Conclusions

- All three corrosion mechanisms contribute to lead release in household plumbing
- Water chemistry can influence all three corrosion mechanisms
- Household plumbing materials dominant source of lead
- No geographic patterns to lead release or water quality trends

Corrosion Study: Results



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LCR Sites
Customer Sites
Lead = 12 ppb or higher
Lead = 5 to 11.9 ppb
Lead = 0 to 4.9 ppb

Next Steps

Decision Tree



Treatment Pilot

- What treatment options will the Pilot consider?
 - pH and/or alkalinity adjustment (water chemistry)
 - Phosphate-based corrosion inhibitors (pipe coating)
- What factors will be evaluated?
 - Lead reduction
 - Impacts to sensitive and industrial users
 - Costs
 - Simultaneous compliance with other water quality regulations
 - Compatibility with multiple sources of supply
 - Sanitary and stormwater discharge considerations

Corrosion Control Treatment Options pH and/or Alkalinity Adjustment

Chemical Name	Other common uses	Other considerations
Baking Soda	Baking leaveners, antacids,	Most expensive of alkalinity
(sodium bicarbonate)	toothpaste	adjustment chemicals
Carbon Dioxide	Carbonated beverages	Used in combination with other chemicals
Caustic Soda (sodium hydroxide)	Soap making, food processing	
Hydrated Lime	Food processing, calcium	Labor intensive O&M
(calcium hydroxide)	supplements	
Soda Ash	Soaps and detergents, glass	
(sodium carbonate)	making, water softening, food	
	processing	

Corrosion Control Treatment Options Corrosion Inhibitors

Chemical Name	Other common uses	Other considerations
Orthophosphate (Phosphoric Acid)	Carbonated beverages, cheese making, baking leaveners	Sanitary and stormwater discharge concerns; compatibility with wholesale customers using other sources
Zinc orthophosphate	Dental cement	Sanitary and stormwater discharge concerns; compatibility with wholesale customers using other sources

Corrosion Control Treatment Practices

Other Utilities

Utility	Treatment Chemical	Utility	Treatment Chemical
South Fork Water Board, Oregon City, OR	Soda ash	Seattle Public Utilities* Seattle, WA	Lime and carbon dioxide
Clackamas River Water, Clackamas, OR	Soda Ash	Metro Vancouver* Vancouver, BC	Lime and soda ash
City of Salem, OR Soda ash Eugene Water and Electric Bd, Sodium hydroxide		Massachusetts Water Resources Authority* Boston, MA	Soda ash and carbon dioxide
Lake Oswego-Tigard Water Partnership, Lake Oswego, OR	Sodium hydroxide	DC Water Washington, DC	Orthophosphate
Joint Water Commission, Hillsboro, OR		Los Angeles Department of Water & Power Los Angeles, CA	Zinc orthophosphate
North Clackamas County Water Commission, Oregon City, OR	Soda ash	Southern Nevada Water Authority Las Vegas, NV	Zinc orthophosphate

*unfiltered water system

Recommendation



Approve contract with Confluence Engineering Group, LLC in the amount of \$664,930 for the Corrosion Control Treatment Pilot Project

What's next?

- Conduct Corrosion Control Treatment Pilot
 - Pilot is first step in multi-phase project to design and construct a corrosion control treatment facility
- •Follow joint PWB/OHA's compliance schedule for improved Corrosion Control Treatment
 - Design contract July 2017
 - Construction contract Fall 2018
- •Continue Interim Lead Reduction Plan
- •Continue to work with community partners