

# MFRWTP Interim Improvements

Longview City Council  
Beacon Hill Sewer District

Joint Workshop – August 20, 2015

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# MFRWTP Interim Improvements

## PRESENTATION OUTLINE

1. Reasons to Consider Improvements
2. Prior Evaluations
3. Potential Improvements
4. Additional Evaluations Recommended
5. Discussion

# Interim Water Quality Improvements

- Improve taste and odor issues while taking steps to implement Ranney
- Premise profiling confirmed degradation within homeowner plumbing
- Mitigate complaints relating to chlorine and sulfide taste and odors
  - Naturally occurring organic nitrogen results in formation of chloramines
    - Chloramines are more persistent than chlorine and tend to create a swimming pool type odor even at low concentrations
  - Loss of oxidizing conditions results in sulfide reversion
    - Hydrogen sulfide is present in groundwater at very low concentration and is fully oxidized during treatment but tends to regenerate in low flow or stagnant conditions
- Relatively simple measures with minimal capital investment
- Potential long term benefit if MFRWTP is used as emergency supply or other future alternate use
- Bench scale and pilot scale testing needed to prove performance
- Department of Health approval required prior to full scale implementation

# Interim WQ Improvements – Prior DO Evaluation

- Evaluated liquid oxygen addition to prevent scale release and reduce need for chlorine
- Used pipe loop rigs to represent worse case scenario
  - Varied flow, stagnation & re-circulation to simulate distribution system
  - Compared low, moderate and high DO levels
  - Monitored Fe and Mn release with changes in chlorine and ORP

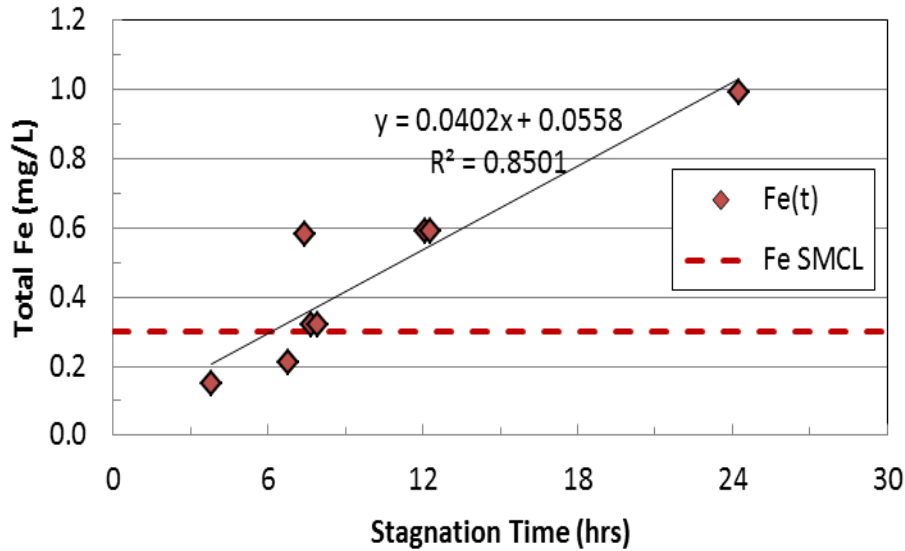


Dissolved Oxygen Containers



Pipe Rigs and Injection Piping

Low DO: Total Fe vs Stagnation Time



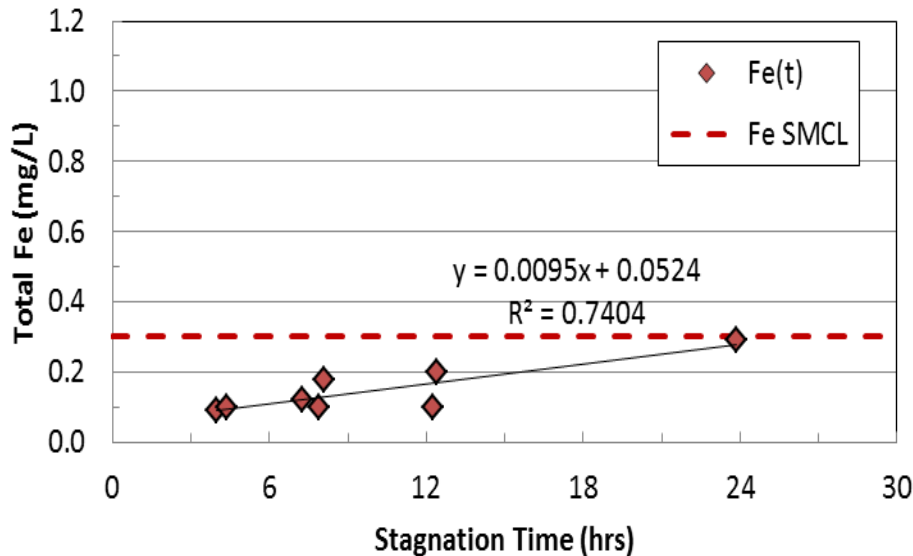
Low DO (0-1 mg/L):

- \* Iron > SMCL after 7-hours

Moderate DO (4-5 mg/L):

- \* Iron < SMCL after 24-hours

Moderate DO: Total Fe vs Stagnation Time



Conclusion

- \* DO will help stabilize and harden existing pipe scales

# Interim WQ Improvements - Implementation Costs

Interim Measure	Benefits provided	Time to Implement (months)	Capital Cost (\$M)	O&M Cost (\$M)	ERU Cost (\$/mo)
Dissolved Oxygen Addition	<ul style="list-style-type: none"> <li>• Improve taste and odor</li> <li>• Reduce sulfide smell</li> <li>• Reduce scale dissolution</li> </ul>	6-12	\$0.31	\$0.04	\$0.19
Coagulant Addition	<ul style="list-style-type: none"> <li>• Improve taste and odor</li> <li>• Reduce chlorine taste/smell</li> <li>• Reduce organic nitrogen</li> </ul>	6-12	\$0.25	\$0.04	\$0.18
Hydrogen Peroxide Addition	<ul style="list-style-type: none"> <li>• Improve taste and odor</li> <li>• Reduce sulfide smell</li> <li>• Reduce chlorine taste/smell</li> <li>• Reduce organic nitrogen</li> <li>• Reduce scale dissolution</li> </ul>	6-12	\$0.25	\$0.12	\$0.42
Post Chlorination	<ul style="list-style-type: none"> <li>• Improve operator control</li> <li>• Reduce chlorine fluctuation</li> <li>• Ongoing plant optimization</li> </ul>	3-6	\$0.18	\$0.02	\$0.10

*Time to implement includes testing, design, DOH approval, procurement & installation*

# Interim WQ Improvements – Feasibility Evaluation

Additional testing needed prior to implementation

- DO stabilizes existing Fe and Mn scale in distribution system mains
  - Evaluate taste and odor benefit
  - Evaluate benefit to premise plumbing
- Organic Nitrogen / Chloramines causing taste and odor complaints
  - Evaluate effect of coagulant addition on chloramines
  - Evaluate effect of hydrogen peroxide on chloramines
  - Evaluate effect of hydrogen peroxide on DO and ORP

# Interim WQ Improvements – Recommended Evaluations

## Confluence Engineering Scope of Work

- Dissolved Oxygen Addition .....\$20,740
    - Prior pipe loop trials demonstrated improvement using liquid oxygen
    - Test commercially available in-line aeration systems using pipe loop
    - Conduct in-home evaluation using preferred system
    - Potential low cost option implemented at plant or homeowner level
  - Coagulant Addition .....\$33,205
    - Bench scale testing to prove concept (ie. jar testing)
    - Pilot scale testing if proven (ie. skid mounted filter columns)
  - Hydrogen Peroxide Addition .....\$33,205
    - Bench scale testing to prove concept (ie. jar testing)
    - Pilot scale testing in proven (ie. skid mounted filter columns)
- Confluence Engineering Total of All Tasks.....\$87,149



# DISCUSSION