

MFRWTP Interim Improvements

Longview City Council
Beacon Hill Sewer District

Joint Workshop – August 20, 2015

Presented by: Amy Blain, Project Manager

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

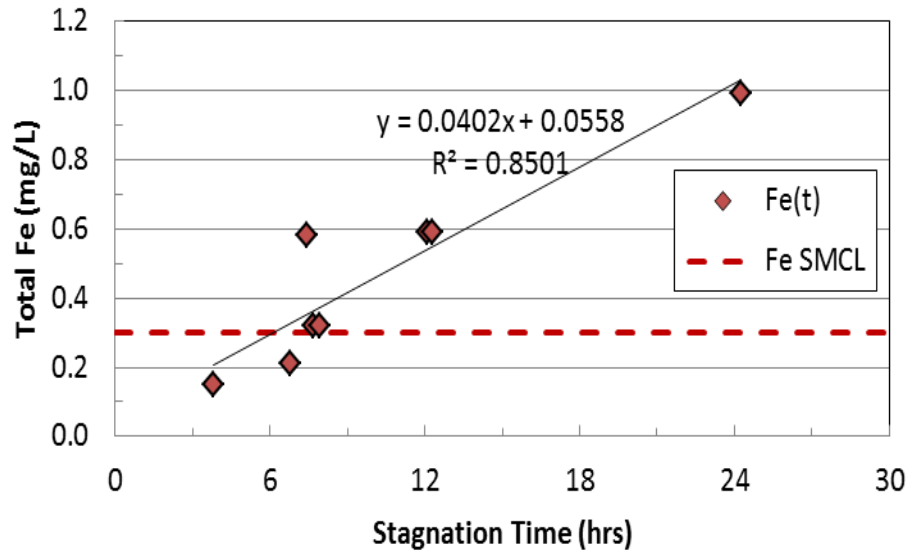


Dissolved Oxygen Containers



Pipe Rigs and Injection Piping

Low DO: Total Fe vs Stagnation Time



Low DO (0-1 mg/L):

- * Iron > SMCL after 7-hours

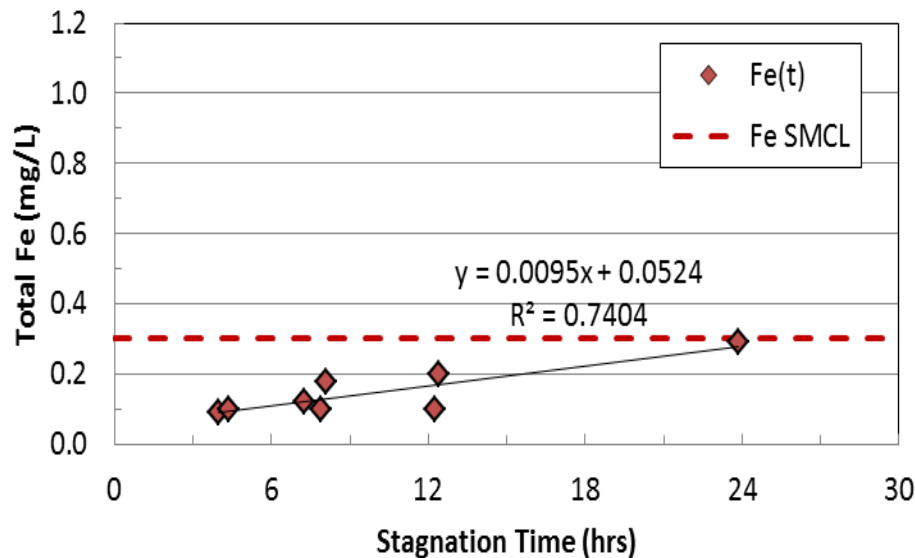
Moderate DO (4-5 mg/L):

- * Iron < SMCL after 24-hours

Conclusion

- * DO will help stabilize and harden existing pipe scales

Moderate DO: Total Fe vs Stagnation Time



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	• Improve taste and odor • Reduce sulfide smell • Reduce scale dissolution	6-12	\$0.31	\$0.04	\$0.19
Coagulant Addition	• Improve taste and odor • Reduce chlorine taste/smell • Reduce organic nitrogen	6-12	\$0.25	\$0.04	\$0.18
Hydrogen Peroxide Addition	• Improve taste and odor • Reduce sulfide smell • Reduce chlorine taste/smell • Reduce organic nitrogen • Reduce scale dissolution	6-12	\$0.25	\$0.12	\$0.42
Post Chlorination	• Improve operator control • Reduce chlorine fluctuation • Ongoing plant optimization	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