

MFRWTP Interim Improvements

Revised From August 20, 2015 Workshop

Longview City Council
Beacon Hill Sewer District

August 27, 2015

MFRWTP Interim Improvements

PRESENTATION OUTLINE

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

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

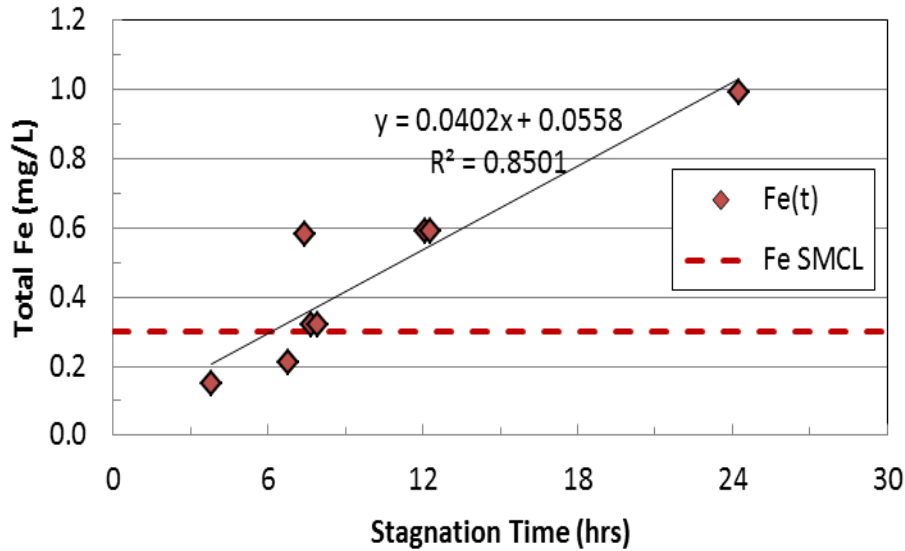


Dissolved Oxygen Containers



Pipe Rigs and Injection Piping

Low DO: Total Fe vs Stagnation Time



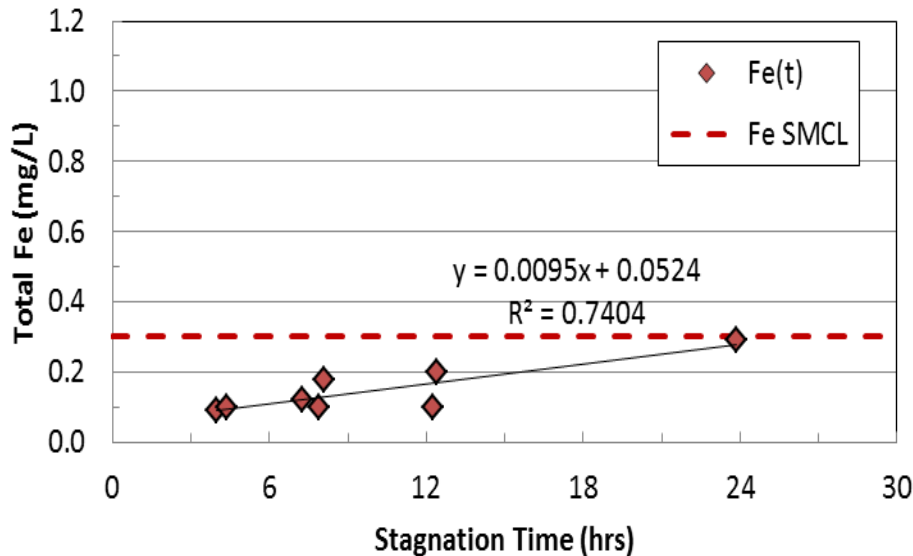
Low DO (0-1 mg/L):

- * 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"> • Improve taste and odor • Reduce sulfide smell • Reduce scale dissolution • Condition pipes for new water source 	6-12	\$0.31	\$0.04	\$0.19
Coagulant Addition	<ul style="list-style-type: none"> • Improve taste and odor • Reduce chlorine taste/smell • Reduce organic nitrogen 	6-12	\$0.25	\$0.04	\$0.18
Hydrogen Peroxide Addition	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Improve operator control • Reduce chlorine fluctuation • Ongoing plant optimization 	3-6	\$0.18	\$0.02	\$0.10

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\$26,298
 - 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 (2 homes)
 - 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.....\$92,708

Interim WQ Improvements

Recommendations:

1. Authorize amendment to Confluence Engineering contract
2. Direct staff to advertise for bids for post-treatment chlorination system