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

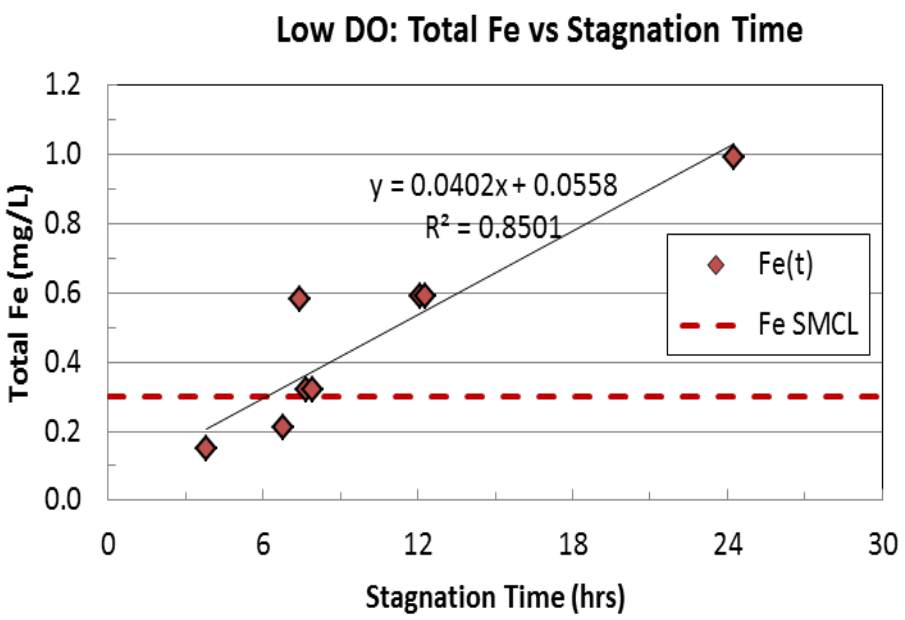
- Improve taste and odor issues while taking steps to implement Ranney
- Premise profiling confirmed degradation within homeowner plumbing
- Mitigate complaints relating to chlorine and sulfide taste and odors
  - Naturally occurring organic nitrogen results in formation of chloramines
    - Chloramines 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

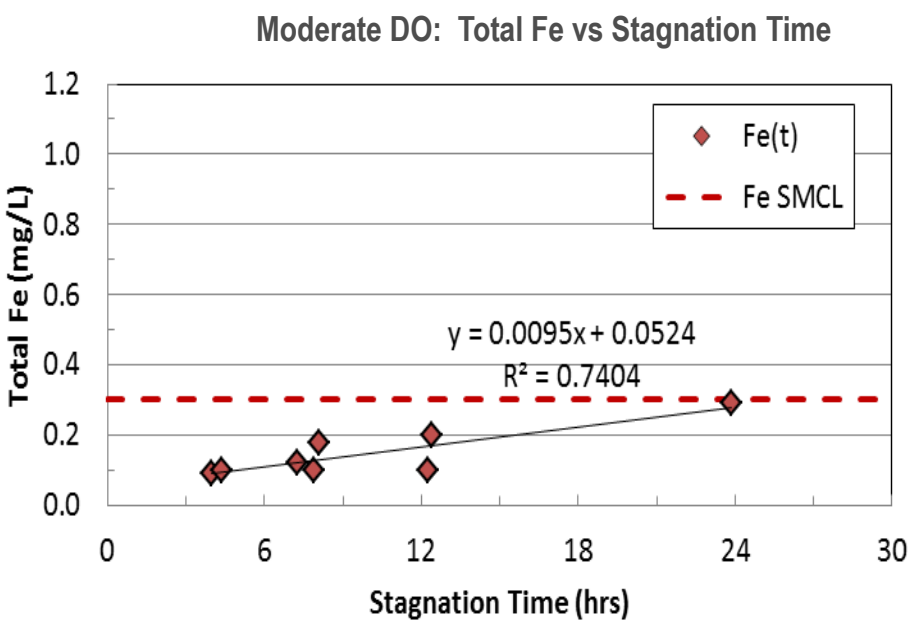
Interim WQ Improvements – Prior DO Evaluation

- 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 (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

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