Bozeman Water Treatment Plant Laboratory Testing Final Recommendations

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Overall Task

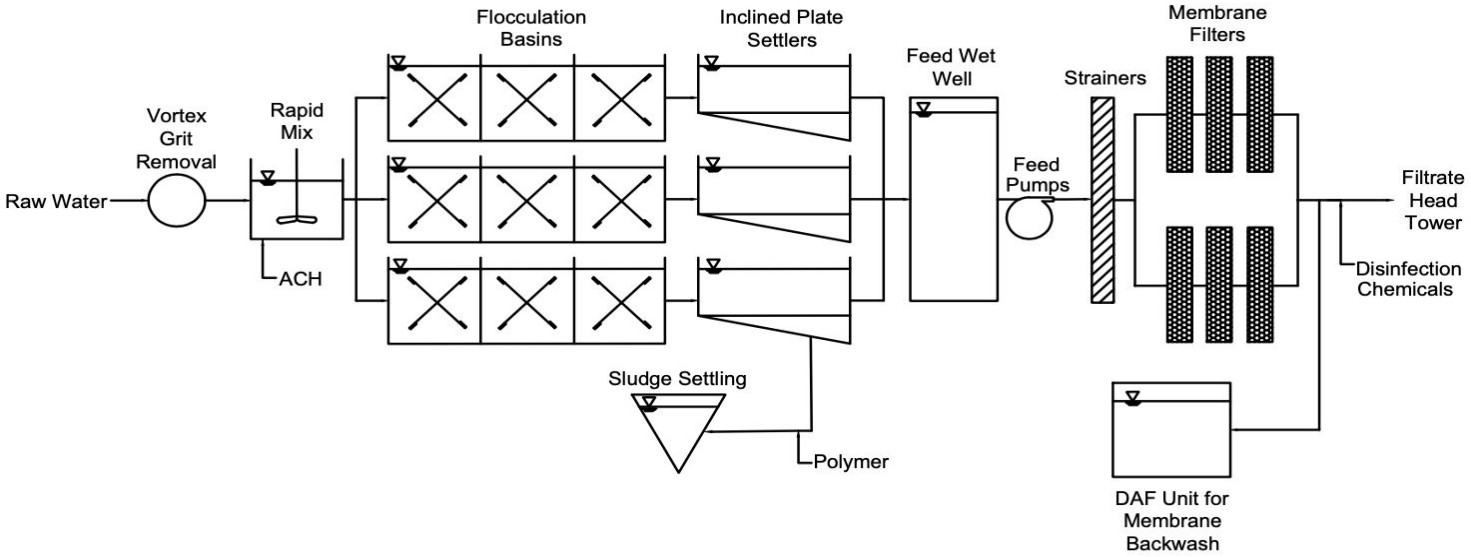

Figure 1.

We were tasked to investigate the optimal chemical doses of ACH for pretreatment, the optimal polymer dosage for sludge handling, and the impact of incorporating backwash.

Results

-Recycling backwash could have a positive impact.

-The optimal dose of ACH is 2 mg/L when backwash is added, but more testing is necessary for varying influent turbidites.

-The optimal polymer dose that enhances the gravity thickening process was found to be 5 mg/L.

Figure 2.

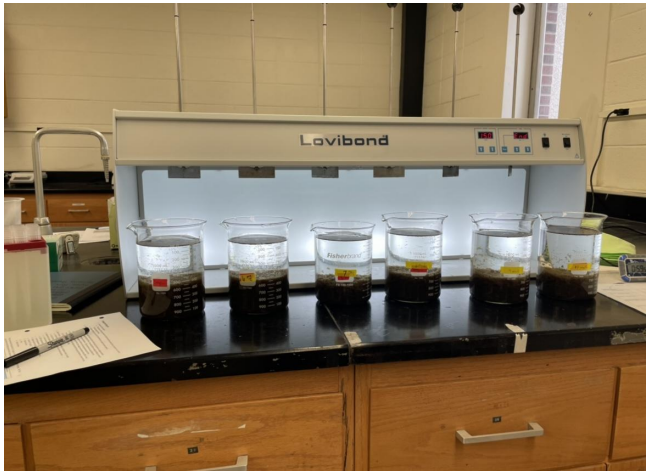

Figure 3.

Recommendations for Recycling Backwash

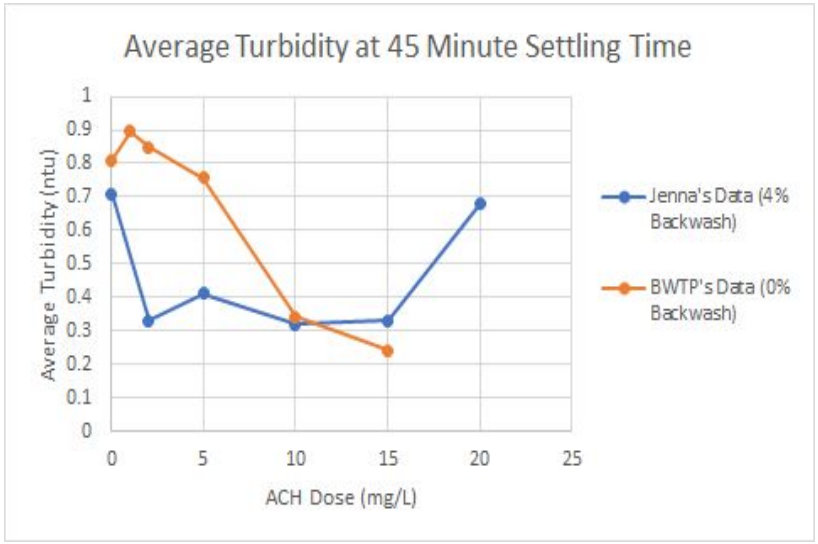

Figure 4.

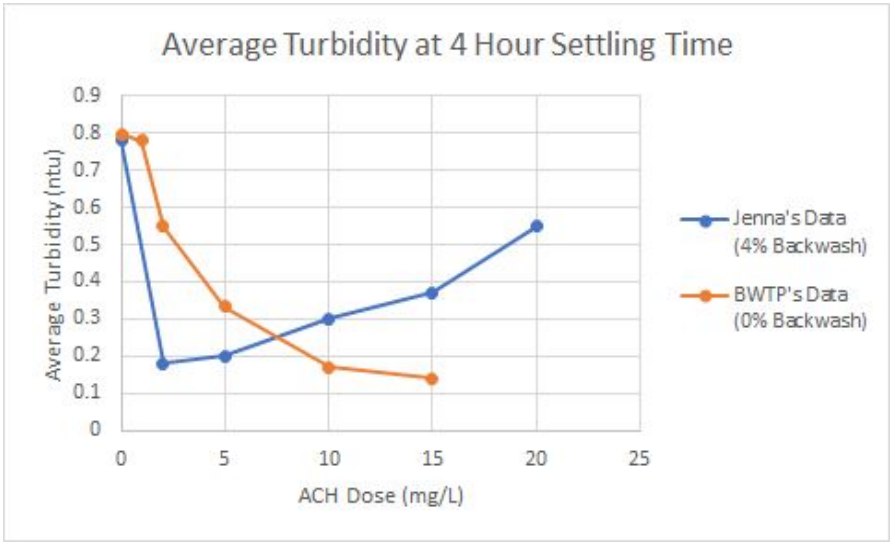

Figure 5.

The turbidity after 4 hours for 0% backwash was 4.12 NTU for Jenna's data vs 0.78 NTU with 4% backwash with no ACH added. The BWTP had 0.798 NTU final turbidity for 0% backwash and no ACH.

Jenna's optimal dose was 2 mg/L with 4% backwash that had a final turbidity of 0.18 NTU vs BWTP data that found 10 mg/L ACH with 0% with 0.171 NTU to be optimal dose.

Recommendation for Coagulant Doses for Pretreatment

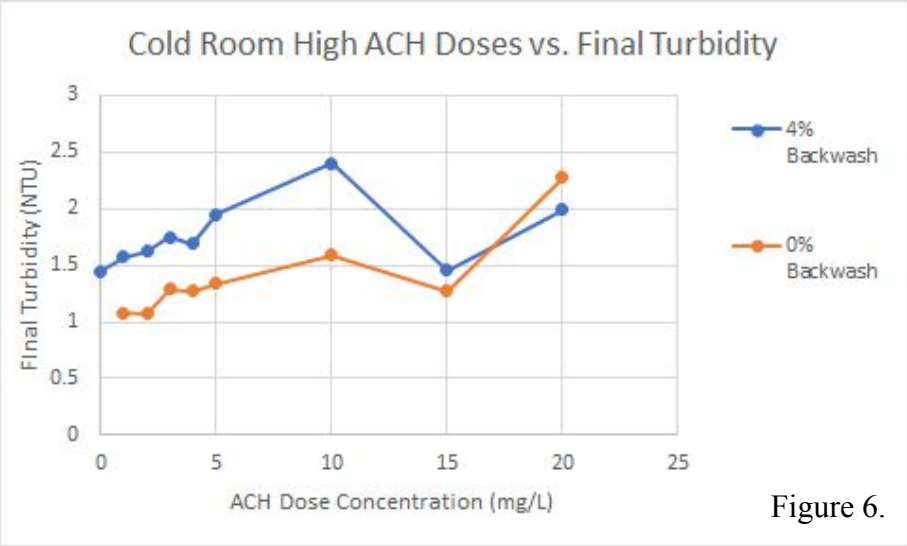

Figure 6.

We recommend a dose of 2 mg/L of ACH.

There is reason to suggest 15 mg/L, but if backwash is also implemented a dose that high would be unnecessary.

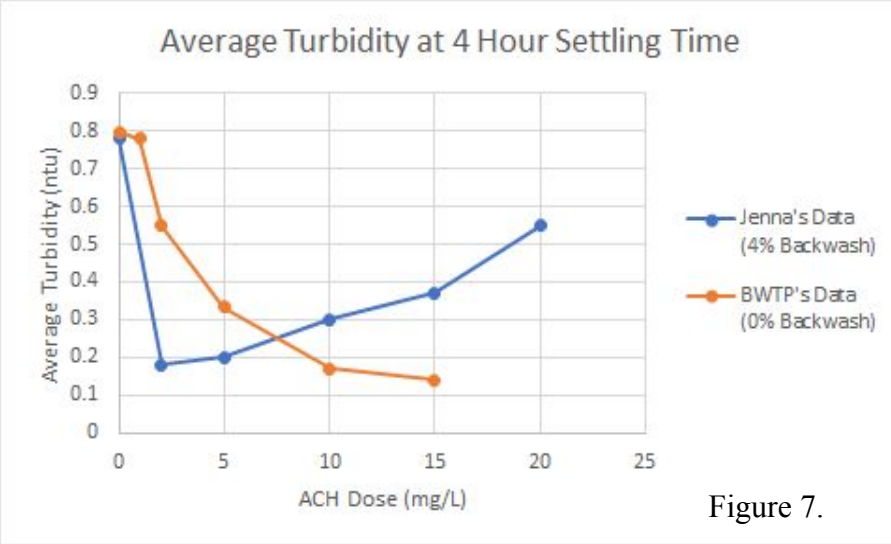

Figure 7.

Due to data inconsistencies, we also recommend further testing to gain more conclusive insight.

Our proposal would cost $21.18/day.

Recommendation for polymer doses for sludge settling

Lower concentrations produced a smaller amount of settling while higher concentrations produced sludge cakes that were more fluffy

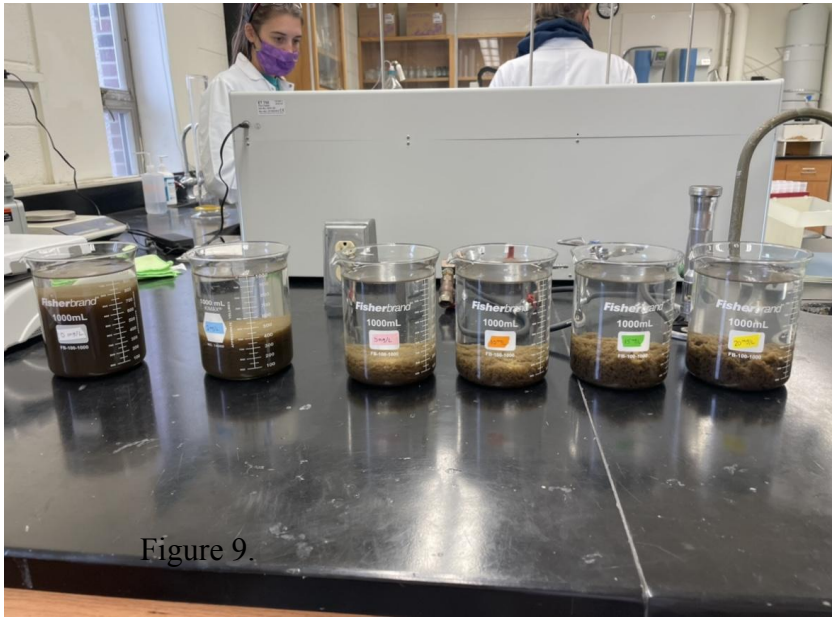

Figure 9.

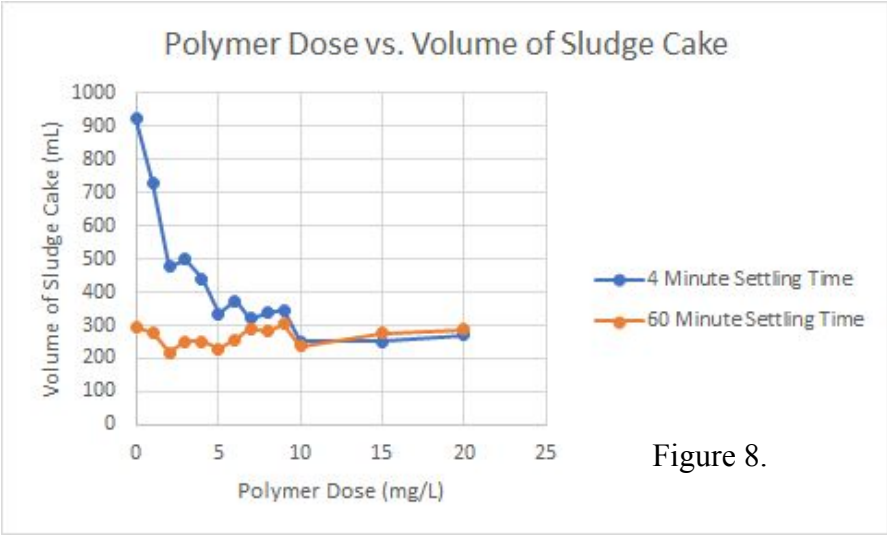

Figure 8.

It is recommended to have the polymer dose be at 5 mg/L

Environmental impacts include:

- No additions to the plant
- Recycle water
- Low polymer dosages

Overall

Figure 10.

From our findings, yes, backwash does impact pretreatment positively. We recommend the optimal dose of ACH is 2 mg/L when backwash is added and the optimal polymer dose to be 5 mg/L

Questions?

Sources

Figure 1. Melmer, Isabelle. *Bozeman Water Treatment Plant overall water treatment process.* 2021, CAD drawing, Bozeman, Montana.

Figure 2. “Jar Testing.” *Google*, Google, https://www.google.com/url?sa=i.

Figure 3. Lord, Alexa. Sludge Settling Lab MSU. 2021, MSU Environmental Engineering Laboratory, Bozeman, Montana.

Figure 4. Group 4. *Recycling backwash data*. 2021, graph of turbidity after 45 minutes for both BWTP data and Jenna data, Bozeman, Montana.

Figure 5. Group 4. *Recycling backwash data*. 2021, graph of turbidity after 4 hours for both BWTP data and Jenna data, Bozeman, Montana.

Figure 6. Group 4. Jar Testing *Data*. 2021, cold room high ACH doses vs final turbidity, Bozeman, Montana.

Figure 7. Group 4. Jar Testing *Data*. 2021, graph of turbidity after 4 hours with 0 and 4% backwash, Bozeman, Montana

Figure 8. Group 4. S*ludge Settling Data*. 2021, graph of data polymer dose vs volume sludge cake, Bozeman, Montana.

Figure 9. Lord, Alexa. *Sludge Settling Lab MSU*. 2021, MSU Environmental Engineering Laboratory, Bozeman, Montana.

Figure 10. “City of Bozeman.” *Water Treatment | City Of Bozeman*, https://www.bozeman.net/government/water-treatment.