

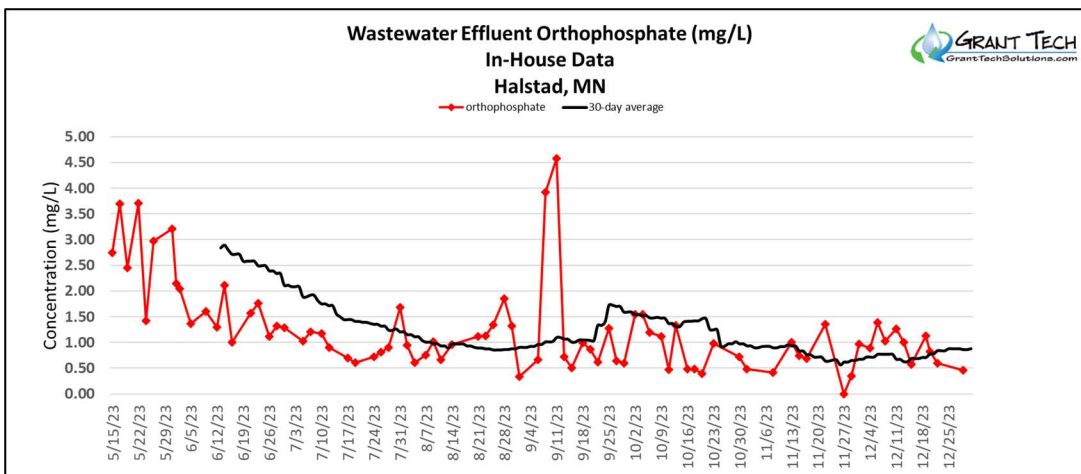
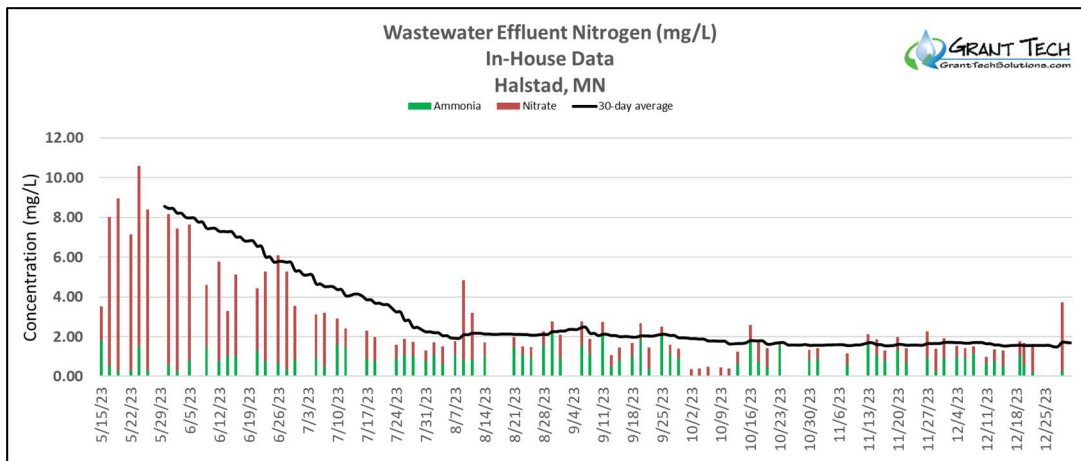


## Addendum to the Red River Basin Commission's Wastewater Treatment Plant Optimization Project – Halstad Minnesota

The Red River Basin commission in partnership with the International Joint Commission and the United States Environmental Protection Agency undertook a series of seminars and site visits for wastewater treatment facilities in the Red River Basin. The seminars and visits happened in 2021-22, including operators and instructors from North Dakota, Minesota and Manitoba. At the end of the project, some funds were left in the project that were offered to the city of Halstad Minnesota on the recommendation of Grant Weaver of Grant Tech Inc. one of the instructional partners of the Optimization Project.

The funds in the amount of roughly \$20,000 were used for two primary activities. First, the utility purchased a handheld water testing Spectrophotometer and a year's supply of testing supplies. Secondly, the facility paid a contractor for control upgrades to be able to have automated timing of aeration blowers in the treatment tanks. This work was completed in early 2023.

The facility, over the course of several months, adjusted the aeration cycle to optimize nitrogen removal. Over the same cycle the facility recycled as small percentage of waste sludge to the headworks to improve phosphorus removal. The following graphs depict the changes in discharge concentrations over time for Nitrogen and Phosphorus.





If calculated using the 30-day moving average for 1 June 2023, approximately 1015 lbs. of Nitrogen and 353 lbs. of Phosphorus were delivered to the river on an annual basis. At the end of 2023 those numbers were reduced to 231 lbs. of Nitrogen and 109 lbs. of Phosphorus annually, reductions of around 70%.

The funds listed above only covered material expenses, there are additional operational expenses associated with this optimization. Over the last year approximately 80 man-hours were invested in the optimization process. There is still a weekly commitment of approximately .25 man-hour to return sludge to the headworks, future efforts will have to consider an additional expense to automate the return of sludge. The city of Halstad had been considering decommissioning the facility in favor of a wastewater lagoon, but the optimization has proven that smaller cost improvements to the existing facility can be cost effective and will be considered in planning moving forward.

### **Operational Notes from the Facility**

Test equipment was necessary for the project and operators to monitor plant permit compliance. Nitrogen and Phosphorus testing was needed during the pilot to adjust for variables of influent levels including high flows. It would not have been possible to avoid significant compliance issues had the test equipment been on hand. The equipment was easy to learn and use and will continue to benefit plant operations.

Implementation of the plan was more time consuming early in 2023. At the end of the year the city is happy with our removals and is still making efforts to improve. Labor times came down to 15 minutes per day when we had full functionality and understanding.

Daily (or more frequently) measurements are necessary for the plant to run properly when we have higher wet weather flows. At year end, extra waste of return activated sludge (RAS) was done to lower the population of sludge that was populating. That was a good sign showing that the sludge was healthy and procreating with high enough dissolved oxygen and food sources available.

*The Red River basin Commission wishes to extend thanks to our great partners in this effort including the International Joint Commission, Environmental Protection Agency, Grant Tech Inc, and the City of Halstad, MN.*