



Birch Bay Water and Sewer District

Serving the Greater Birch Bay Area Since 1968

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Nitrogen Optimization Report – 2025

Question Number 3

Permit Section S5.C.1.a – Treatment Assessment

1. **Lab Data:** Operators at Birch Bay Water and Sewer District (BBWSD) perform required nutrient sampling and analysis, in addition to other Municipal Industrial Permit requirements and process control parameters. We have a pending application to be accredited for ammonia analyses. Upon approval, we intend to pursue nitrate and nitrite accreditation as well. In the meantime, we have been performing in house analysis for all samples sent to our third party certified lab (Edge Analytical). Our results have shown consistent accuracy when compared to certified results. Operators pay close attention to lab results and make process adjustments accordingly, based on increasing influent loading and/or decreasing effluent quality.
2. **On-line instrumentation:** Continuous monitoring instruments provides real-time data that can inform operators when conditions change or adjustments need to be made. Instrument data is compared to lab bench results weekly for accuracy. On-line data can also be used to automate processes. Currently, effluent UVT% is being used to control UV dosage and aeration basin dissolved oxygen (DO) can be “boosted” if the effluent ammonia level exceeds a maximum setpoint. In 2023, pH and ammonia/nitrate sensors were installed at the Headworks to monitor influent nutrients. We are considering new control programming that could fine tune DO blower speed based on influent ammonia loading. Nutrient on-line monitoring includes: influent pH, ammonia, nitrate, effluent pH, UVT%, ammonia, nitrate, and total suspended solids (TSS). UVT% measurement can also be used to calculate estimated BOD, therefore we have continuous effluent BOD measurements as well. These instruments have provided us the ability to make process changes 24/7 and be more proactive in our nutrient removal approach.
3. **SCADA Trending Data:** One of the biggest benefits of on-line instrumentation is trending data. We have created numerous nutrient trend reports that compares influent and effluent parameters, as well as aeration basin conditions, DO, mixed liquor TSS concentration, MCRT, and SRT. Trends inform operators of changing conditions, spikes, and abnormalities. This is a much more powerful tool than simply reviewing singular data points.
4. **Access Database:** All process data, lab results, and SCADA historian data is entered or exported to an Access Database that contains all operations data. This database allows us to analyze and compare historical data, as well as generate queries and reports that help us understand our data better. These reports are reviewed regularly and help operators make process control decisions.

BBWSD uses a combination of lab data, on-line instrumentation, SCADA trends, and Access Database to evaluate nitrogen removal optimization approaches and assess overall treatment performance. Operators continuously work to monitor, adjust, modify set points and processes needed to improve results and maximize existing capabilities. Unfortunately we did not achieve our 2024 goal of <25,000 pounds and <10 mg/l annual average total inorganic nitrogen (TIN). We remain well below our TIN action level of 66,400 pounds per year.