

### THE CHALLENGE:

Planning for future permit effluent limits always carries the risk of significant capital costs. With the recent Puget Sound Nutrient Permit nitrogen limits becoming more stringent, the City of Mount Vernon, WA WWTP needed to explore cost-effective options to achieve Total Inorganic Nitrogen (TIN) removal at their facility. The plant had recently finished a 38.5-million-dollar upgrade to reduce combined sewer overflows (CSOs), and the proposed TIN permit would require the facility to spend millions more in upgrades, or de-rate the plant capacity. The existing MLE process was suited for removing nitrogen, but not doing so year-round, and not at plant design flows. Their challenge was this: achieve stable nitrification and denitrification without spending millions of dollars on new concrete tanks.



Facility Flows	8.8 MGD Peak Flow Observed 4.0 MGD Average Flow
Effluent Goals	Ammonia: 1.0 mg/L TIN Removal
Project Goals	Maintain Capacity with more stringent limits Nitrification/Denitrification Improve Settling

### WHY THE MOB PROCESS WAS CHOSEN:

Nuvoda's MOB Process was installed at the Mount Vernon WWTP on a trial basis to increase nitrification, as the plant already had denitrification capacity. After establishing the biofilms, complete nitrification was achieved and sustained throughout the winter despite the low water temperatures and denitrification followed, resulting in the lowest effluent Total Inorganic Nitrogen concentrations observed to date. The MOB Process offered low installation costs, ease of incorporation into the existing facility, and no concrete for extra treatment volume.

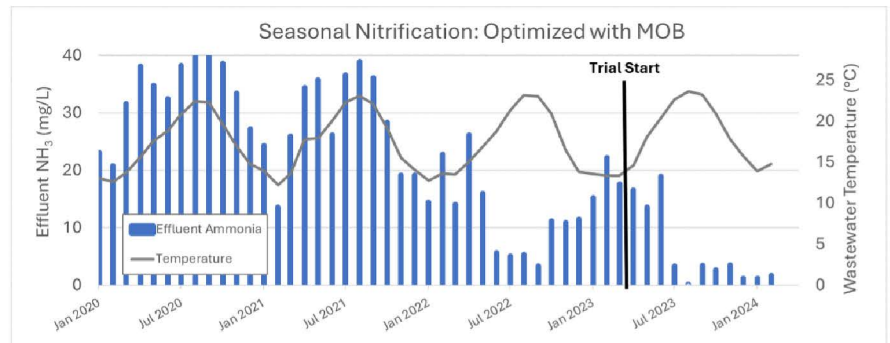
### WHAT WAS ACHIEVED:

-  Sustained Nitrification during Winter Season Temperatures
-  Historically Low Effluent TIN
-  Installed without Facility Down-Time
-  Less Susceptibility to Variable Loadings



### Effluent Total Inorganic Nitrogen (TIN), mg/L

2020	36.0
2021	32.9
2022	18.3
12-Month Trial	11.8



### WHAT THE MOB PROCESS CAN DO FOR YOU:

- Improved Nitrification and Nutrient Removal
- Resilience to Upsets, Load Variation, and Low Temperatures - Down to 8°C
- Stabilized Settling Performance
- Retrofits into any Process Configuration