

Wastewater Treatment Plant

Optimization Summary

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Prepared by



Table of Contents

Introduction..... 3

Project Background..... 3

 Permit Limits: 3

 Ammonia Limits: 3

 Flow Design Criteria:..... 3

Data Review and Analysis 4

 1. Effluent Flows..... 4

 2. CBOD and TSS Improvements..... 5

 3. Aeration Project and Oxygen Supply..... 6

 4. Ammonia Removal 6

Conclusion 6

Introduction

In August 2024, Sweet Home Wastewater Treatment Plant (WWTP) completed several key upgrades aimed at enhancing treatment capabilities and ensuring compliance with National Pollutant Discharge Elimination System (NPDES) permit requirements. These upgrades, including the installation of two aerators, enhance the oxygen supply to the activated sludge process, addressing plant upsets and improving overall wastewater treatment.

Project Background

Following multiple NPDES permit violations due to plant upsets in August 2022, process control adjustments were initiated. The primary goal of the improvements is to optimize wastewater treatment, maintain compliance with permit limits, and prevent future violations.

Permit Limits:

- August 1 to October 31:
 - TSS (Total Suspended Solids): 10 mg/l (monthly average)
 - CBOD (Carbonaceous Biochemical Oxygen Demand): 10 mg/l (monthly average)
- November 1 to December 31:
 - TSS: 20 mg/l (monthly average)
 - CBOD: 15 mg/l (monthly average)

These values are used to calculate monthly, weekly, and daily average pounds of contaminants discharged to the South Santiam River.

Ammonia Limits:

- The current permit does not include an ammonia limit, though prior conditions specified:
 - Monthly Average Ammonia Limit: 5.1 mg/l
 - Daily Maximum Ammonia Limit: 11 mg/l

Flow Design Criteria:

- Average Dry Weather Design Flow: 1.38 million gallons per day (mgd)
- Average Wet Weather Design Flow: 2.68 mgd
- Peak Day Design Flow: 5.6 mgd

Data Review and Analysis

Data from September 2022 to December 2024 was reviewed, focusing on monthly maximum daily sample values to evaluate the effectiveness of the upgrades.

1. Effluent Flows

Flows during the transition from dry to wet weather are similar from year to year. Figure 1 shows that December 2023 and 2024 peak flows exceeded the plant's design capacity (5.7 mgd), reaching around 6.3 mgd, which led to overflow incidents when the treatment plant reached its hydraulic limit.

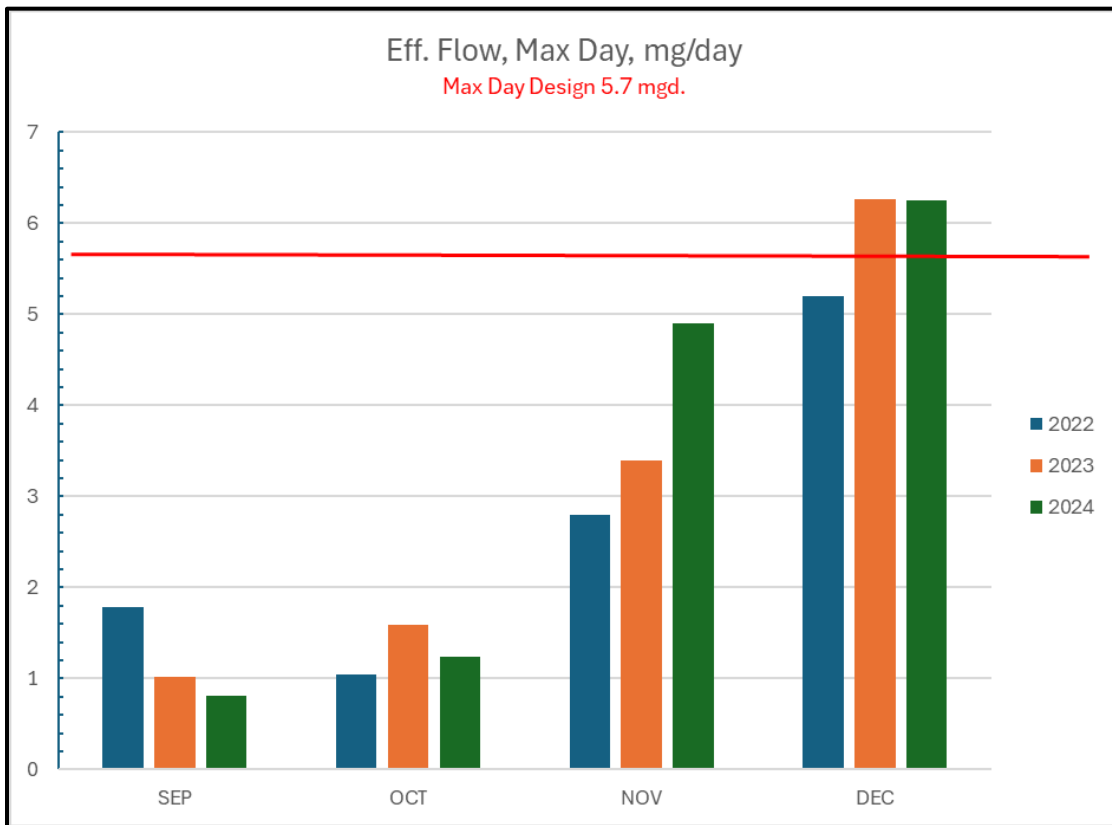


Figure 1

2. CBOD and TSS Improvements

In 2022, the plant experienced an upset in the activated sludge system. As a result, the facility implemented enhanced process control strategies, leading to improved treatment, as evidenced by Figures 2 and 3. The refurbishment of tertiary filters and secondary clarifiers in 2024 resulted in significantly lower TSS values compared to previous years.

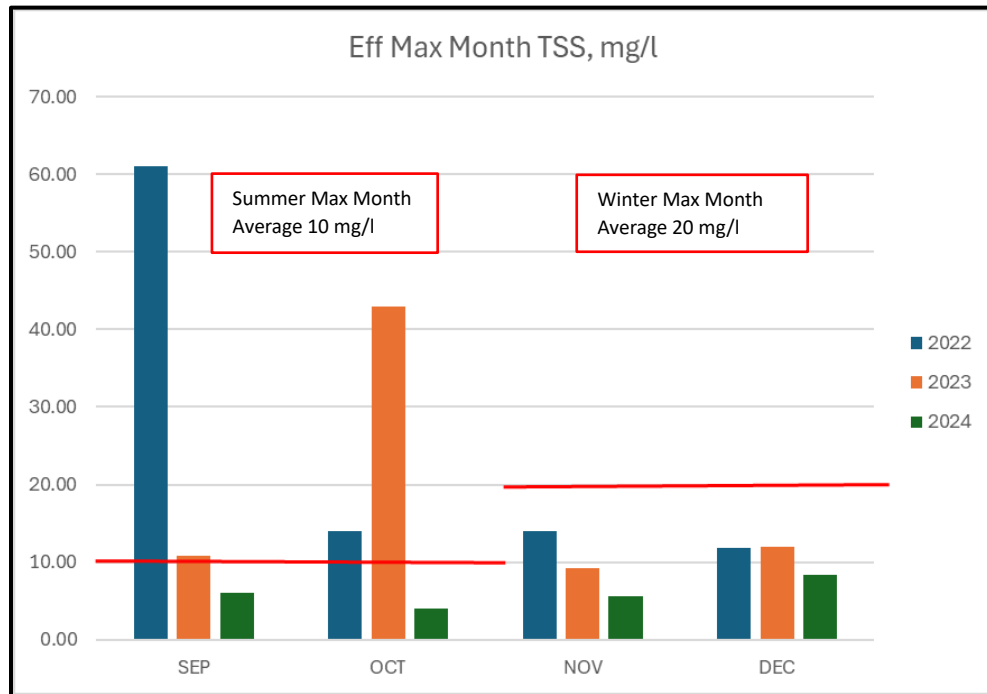


Figure 2

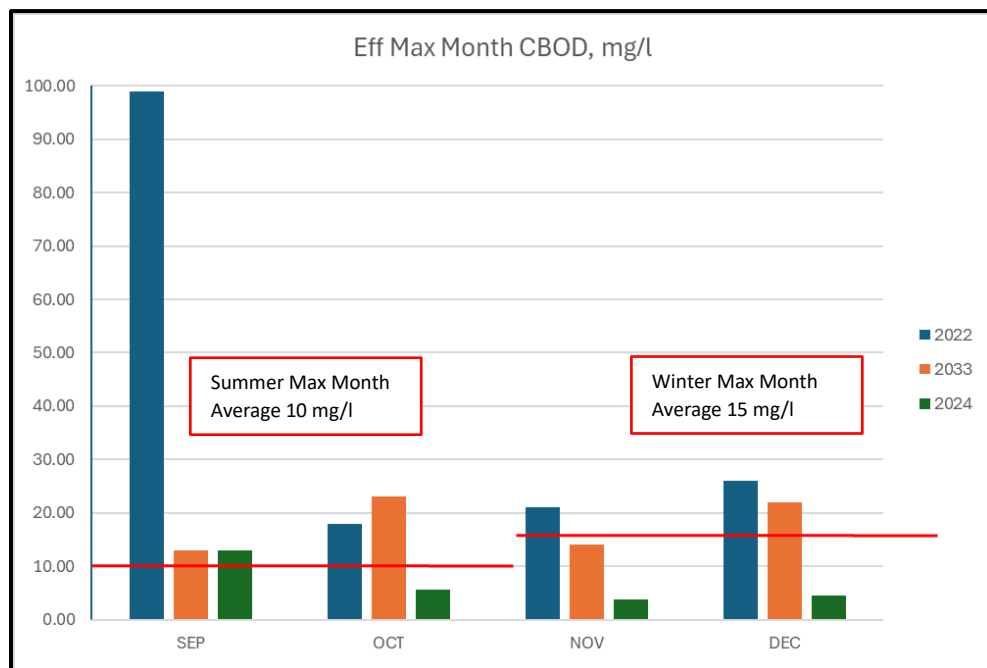


Figure 3

3. Aeration Project and Oxygen Supply

In August 2024, the installation of an aspirating aerator in each aeration basin supplemented the oxygen supply, which contributed to enhanced nitrification and CBOD removal. Figure 3 shows a marked improvement in CBOD removal after a stabilization period in September 2024.

4. Ammonia Removal

Nitrification, which is responsible for ammonia removal, has improved due to increased oxygen availability, allowing the process to function well below the previous ammonia limit. This improvement has enhanced the overall stability of the activated sludge system, promoting better settling and more effective TSS and CBOD removal.

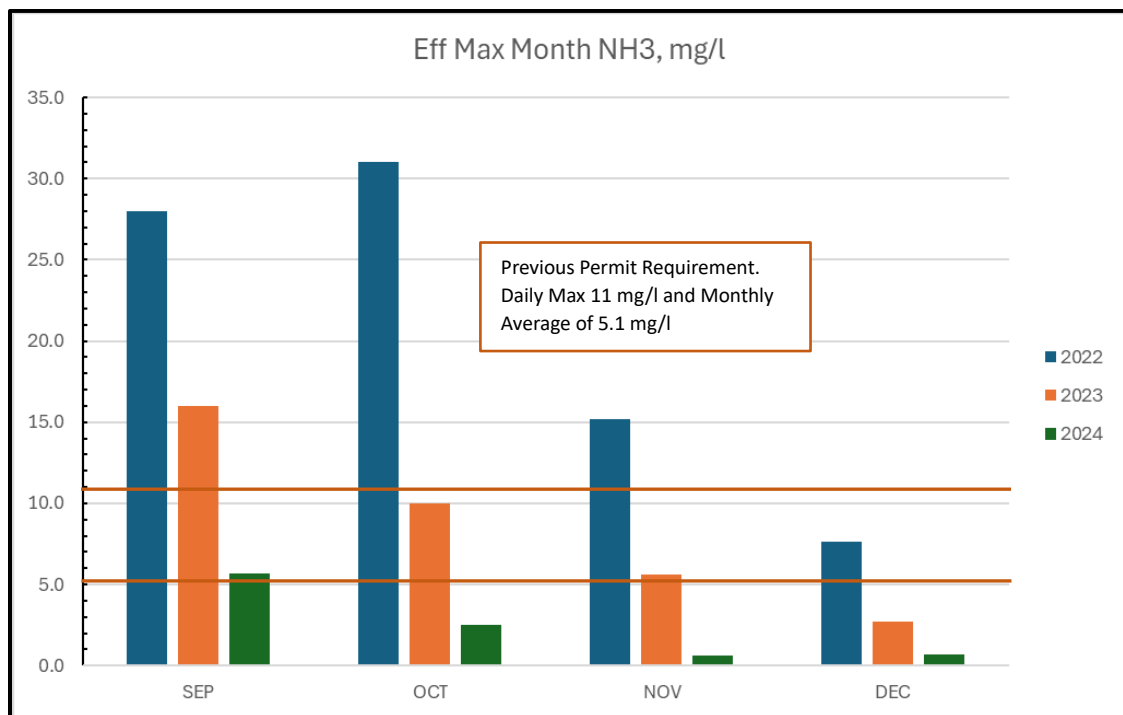


Figure 4

Conclusion

The process improvements, including mechanical equipment upgrades and the addition of aerators, have enhanced the plant’s capacity to meet NPDES permit limits for TSS and CBOD, as well as improve ammonia removal. Monitoring and ongoing performance analysis are necessary to assess the long-term success of these measures, particularly during periods of high wet weather flows that may exceed the design flow capacities.