

**Appleton Wastewater Treatment Plant
Operations Synopsis
October 2021 – December 2021**

Wastewater Treatment Program

- The Appleton Wastewater Treatment Plant (AWWTP) final effluent met Wisconsin Department of Natural Resources (WDNR) discharge monitoring reporting limits for carbonaceous biochemical oxygen demand (CBOD), total suspended solids (TSS), phosphorous, and ammonia. The plant maintained good treatment and a healthy microbiological population with a sludge retention time of 10.5 days. Dewatering processes functioned well and converted 17.2 million gallons (MG) of primary digested sludge to biosolids.

Summary of Treatment

| Parameter | October | November | December | Average |
|---|----------------|-----------------|-----------------|----------------|
| Industrial Flow (MG) | 28.2 | 30.1 | 35.2 | 31.2 |
| Domestic Flow (MG) | 210.6 | 196.1 | 244.5 | 217.1 |
| Total Flow (MG) | 238.8 | 226.2 | 279.7 | 248.2 |
| Influent CBOD Load (Avg Daily lbs) | 22,823 | 21,361 | 22,716 | 22,300 |
| Influent TSS Load (Avg Daily lbs) | 39,975 | 41,426 | 44,747 | 42,049 |
| Influent Phosphorous Load (Avg Daily lbs) | 499 | 480 | 515 | 498 |
| Influent Ammonia Load (Avg Daily lbs) | 2,031 | 2,054 | 2,478 | 2,188 |
| Effluent CBOD Load (Avg Daily lbs) | 307 | 359 | 426 | 364 |
| Effluent TSS Load (Avg Daily lbs) | 254 | 223 | 281 | 253 |
| Effluent Phosphorous Load (Avg Daily lbs) | 24 | 18 | 13 | 18 |
| Effluent Ammonia Load (Avg Daily lbs) | 32 | 43 | 102 | 59 |
| % Treatment Removal of CBOD | 98.7 | 98.3 | 98.1 | 98.4 |
| % Treatment Removal of TSS | 99.4 | 99.5 | 99.4 | 99.4 |
| % Treatment Removal of Phosphorous | 95.2 | 96.3 | 97.5 | 96.3 |
| % Treatment Removal of Ammonia | 98.4 | 97.9 | 95.9 | 97.4 |

Work in Progress:

- 2019 Appleton Wastewater Plant Improvement Projects: The project includes replacement of the Return Activated Sludge (RAS) pumps, process piping modifications (e.g., blended sludge, filtrate, waste gas flare), outside secondary chemical offloading containment repairs, primary clarifiers #5 & #6 drive replacements (2020 CIP), and H-Building effluent pump replacements (2020 CIP). Staab Construction (Staab) proceeded with construction activities during the reporting period. Work completed through the reporting period included the waste gas flare rehabilitation, filtrate pipe modifications, blended sludge pipe replacement, plant air compressor replacements, primary clarifier drive replacement, RAS Pumps #1 – #6 and #12, and removal of remnant RFE system equipment. Final project completion is set for March 2022, but ongoing supply chain disruptions will likely require this be extended.
- Appleton Wastewater Plant Sludge Storage Building Addition: Applied Technologies, Inc. (ATI) advanced preliminary design work on the concept selected by Project Team staff which best met the needs of the AWWTP from a regulatory, functionality, reliability, efficiency, and capital cost standpoint. ATI provided 60% design plans for review during the final quarter of 2021. The public bidding phase is scheduled to occur in March 2022.

- 2021 Appleton Wastewater Plant Solids Dewatering Equipment Upgrades: McMahon Associates, Inc. (McMahon) continued engineering services as part of the Solids Dewatering Equipment Upgrades project. The AWWTP will be adding one additional BFP (for a total of four new) which will provide the required dewatering capacity based on future growth projections and redundancy to facilitate critical maintenance events. McMahon is to present 60% design plans for review in January 2022. The public bidding phase is scheduled to occur in March 2022.
- 2021 Secondary Clarifier Drive Rebuild Project: On June 2, 2021, Common Council approved contract award for the removal, rebuilding, and reinstallation of drive equipment on Secondary Clarifiers #1 through #6 to Sabel Mechanical. Common Council also approved the sole source purchase of the associated rebuild parts through the original equipment manufacturer, Evoqua. Supply chain disruptions contributed to significant upfront delays with delivery of major parts and equipment. Complete shipments were finally received late in September 2021 which allowed Sabel to commence with the removal of drives on Secondary Clarifiers #3 and #6 on October 5, 2021. Final project completion is not anticipated to occur until the spring of 2022.

Regulatory Summary

- Monthly Discharge Monitoring reports for October, November, and December were filed electronically on time for regulatory compliance.
- The AWWTP Wisconsin Pollution Discharge Elimination System (WPDES) electronic permit application was submitted on October 2, 2021, as part of reissuance. The DNR will be submitting a draft permit for review and comment during the 1st quarter of 2022. The current WPDES permit expires on March 31, 2022.

Laboratory

- All sampling and laboratory testing procedures were performed in accordance with requirements outlined in the AWWTP WPDES permit.
- Discharge Monitoring Report (DMR) and Health Department testing program objectives associated with sampling and analysis were met during the reporting period.
- Analysis of Single-Blind Proficiency samples for laboratory recertification occurred during the reporting period.
- Sampling of influent in support of Wisconsin State Lab of Hygiene COVID Sewage Surveillance continued during the reporting period.

EFFLUENT QUALITY SUMMARY
July 2020/2021 – December 2020/2021

Table 1 – 2020 Monthly Permit Summary

| Month | CBOD (mg/L) | TSS (mg/L) | TSS (lbs/day) | P (mg/L) | P ⁽³⁾ (lbs/day) | NH3-N ⁽¹⁾ (mg/L) | Fecal ⁽²⁾ Coliform Colonies/ (100 ml) | Chlorine ⁽²⁾ Residual (mg/L) | pH (s.u.) |
|----------------|-------------|------------|---|----------|----------------------------|-----------------------------|--|---|-----------------------|
| Permit Limit | 25 | 30 | 1,322 ⁽³⁾ | 1 | 23 ⁽³⁾ | 10, 11, 4.4, 18 | 400 col/100ml Geo.Mean | 0.038 mg/L daily | 6.0 - 9.0 daily limit |
| July 2020 | 4 | 2 | 311 | 0.25 | 30 | 0.73 | 4 | <0.032 | 6.7/6.9 |
| August 2020 | 6 | 3 | 189 | 0.30 | 19 | 1.15 | 11 | <0.032 | 6.6/7.2 |
| September 2020 | 6 | 3 | 191 | 0.34 | 23 | 0.81 | 8 | <0.032 | 6.8/7.2 |
| October 2020 | 6 | 4 | 373 | 0.31 | 26 | 0.88 | NA | NA | 7.1/7.4 |
| November 2020 | 6 | 3 | 286 | 0.19 | 18 | 0.59 | NA | NA | 6.9/7.2 |
| December 2020 | 7 | 5 | 347 | 0.28 | 20 | 3.96 | NA | NA | 6.88/7.11 |
| | | | Nov - April Period Average⁽³⁾ | | 21.0 | | | | |
| | | | May - October Period Average⁽³⁾ | | 22.5 | | | | |

Table 2 – 2021 Monthly Permit Summary

| Month | CBOD (mg/L) | TSS (mg/L) | TSS (lbs/day) | P (mg/L) | P ⁽³⁾ (lbs/day) | NH3-N ⁽¹⁾ (mg/L) | Fecal ⁽²⁾ Coliform Colonies/ (100 ml) | Chlorine ⁽²⁾ Residual (mg/L) | pH (s.u.) |
|----------------|-------------|------------|---------------|---|----------------------------|-----------------------------|--|---|-----------|
| July 2021 | 4 | 2 | 382 | 0.16 | 22 | 0.36 | 5 | <0.032 | 7.1/7.4 |
| August 2021 | 4 | 2 | 259 | 0.21 | 23 | 0.25 | 28 | <0.032 | 7.1/7.3 |
| September 2021 | 4 | 1 | 90 | 0.19 | 15 | 0.12 | 4 | <0.032 | 7.1/7.3 |
| October 2021 | 5 | 4 | 254 | 0.37 | 24 | 0.50 | NA | NA | 7.3/7.3 |
| November 2021 | 6 | 4 | 223 | 0.28 | 18 | 0.69 | NA | NA | 6.5/7.4 |
| December 2021 | 6 | 4 | 281 | 0.18 | 13 | 1.38 | NA | NA | 7.1/7.2 |
| | | | | Nov - April Period Average⁽³⁾ | | 15.5 | | | |
| | | | | May - October Period Average⁽³⁾ | | 21.1 | | | |

NOTES:

- 1) Seasonal NH3-N limits: 10 mg/L Jan. 1 – Mar. 31, 11 mg/L Apr. 1 – May 31, 4.4 mg/L June 1 – Sep 30, 18 mg/L Oct 1 – Dec 31.
- 2) Seasonal fecal and residual chlorine limits are in effect May 1st through September 30th. Limit of Detection 0.032 mg/L.
- 3) April 1, 2017 WPDES Reissuance with new TSS limits expressed as monthly concentration limit (mg/L) and loading limit (lbs). The future TMDL phosphorus limit will be 23 lbs/day expressed as a 6-month average during the months of May – October and November – April.