Permit Fact Sheet

General Information

Permit Number:	WI-0003671-09-0
Permittee Name:	Ahlstrom Mosinee LLC
Address:	100 Main St
City/State/Zip:	Mosinee WI 54455
Discharge Location:	Outfall 001: 44°47'14.5"N 89°41'55.7"W Outfall 005: 44°47'17.2"N 89°41'48.0"W Outfall 007: 44°47'18.9"N 89°41'46.8"W Outfall 008: 44°47'18.6"N 89°41'47.1"W
Receiving Water:	Wisconsin River (WBIC 1179900)
StreamFlow ($Q_{7,10}$):	911cfs
Stream Classification:	Warm Water Sport Fish Community, Non-public Water Supply

Facility Description

Name and Ownership Change: On June 26, 2013, Expera Specialty Solutions, LLC began operating the Mosinee Mill under a lease agreement with Wausau Paper Mills, LLC. Additionally on this date, both parties finalized a permit transfer agreement where Expera Specialty Solutions, LLC accepted the terms and conditions of this permit.

On November 26, 2018 Expera Specialty Solutions, LLC underwent a name change as a result of a transaction between its parent company, Expera Specialty Solutions LLC and Ahlstrom-Munksjo. Expera then became a wholly-owned subsidiary of Ahlstrom-Munksjo. The legal name of Expera Specialty Solutions LLC became Ahlstrom Munksjo NA Specialty Solutions LLC, with the Mosinee Mill now known as Ahlstrom Mosinee LLC.

Products: The Mosinee Mill produces 299 TPD (tons per day) of unbleached kraft hardwood and softwood pulps. From the unbleached pulp and purchased bleached pulp, the Mosinee Mill produces, on average, 318 TPD of unbleached and bleached kraft papers, primarily for specialty industrial markets. The Mosinee Mill manufactures hundreds of specialty papers from dozens of paper grades. Each specialty paper is made to the customer's specifications. Example applications of the Mill's paper include wrapping for single edge razor blades, backing for masking tape, insulating wrap for electrical wires, absorptive pads for evaporative coolers, expandable paper folders, seed germinating paper, layering material for high pressure laminates such as Formica and food packaging composite fiber cans for biscuit dough, cleaners and potato chips.

The Mosinee Mill treats its process wastewaters prior to discharge to the Wisconsin River. The Mill's wastewater treatment system provides pH neutralization, primary clarification and secondary biological treatment via a three-stage, oxygen activated-sludge process. Sulfuric acid and sodium hydroxide are used to neutralize wastewaters, phosphoric acid and aqueous ammonia are added to the biological treatment system as nutrients, and alum and polymer are added to the secondary clarifier to enhance settling. Treatment system sludge is dewatered and subsequently combusted as fuel in an onsite power boiler or landfilled at the onsite landfill.

The Mosinee Mill can divert treatment system influent and effluent to a holding pond, which is located adjacent to the

Mill's landfill. The Mill utilizes the pond to store groundwater collected downgradient from its landfill, effluent during the wasteload allocation season when effluent limitations are restrictive, and spills that occur within production facilities. The Mill pumps the contents of the holding pond and blends it with the influent to the Mill's wastewater treatment system.

Production activities at the Mosinee Mill generate on average 10.2 MGD (million gallons per day) of treated process wastewaters and 12.9 MGD of noncontact cooling water. Quality of treated process wastewaters averaged 12 mg/L of BOD_5 (5-day biochemical oxygen demand), 22.9 mg/L of TSS (total suspended solids), and 0.29 mg/L of total phosphorus. (See Appendix A for additional discharge data).

Sanitary wastes are discharged to the City of Mosinee.

Substantial Compliance Determination

Enforcement During Last Permit: Three non-related notices of noncompliance issued during the previous permit term. All required actions pertaining to the notices were completed. The department will continue to monitor holding pond transfer line spills and may consider more drastic actions from the permittee if spills continue to transpire.

After a desk top review of all discharge monitoring reports, land app reports, compliance schedule items and a site visit on 06/15/2023, this facility has been found to be in substantial compliance with their current permit.

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)**
701	24.7 MGD (2016 – 2021)	Wisconsin River water intake structure for process and cooling water.
001	10.2 MGD (2016 – 2021)	At Sampling Point 001, a Parshall flume that is located downstream from the secondary clarifier, treated process wastewaters shall be monitored prior to discharge to the Wisconsin River via Outfall 001. Outfall 001 is located in the center of the east channel of the Wisconsin River approximately 440 yards downstream from the U.S. Highway 153 bridge.
005	12.9 MGD (2016 – 2021)	At Sampling Point 005, which is located at a Parshall flume just upgradient from the outfall, noncontact cooling water and main mill sump overflow of untreated river water shall be monitored after mixing, but prior to discharge to the Wisconsin River via Outfall 005. Outfall 005 is located on the east bank of the east channel of the Wisconsin River approximately 330 yards downstream from the U.S. Highway 153 bridge.
007	0.072 MGD (when discharge occurs, 2016 - 2021)	At Sampling Point 007, which is located at the base of No. 1 Hydro Generator wheel assembly, bearing noncontact cooling and lubrication water shall be monitored prior to combining with hydro wheel discharge.
008	0.0072 MGD (when discharge occurs, 2016 - 2021)	At Sampling Point 008, which is located on the generating wheel subfloor, backwash from the filter used to treat cooling water for No. 1 Hydro Generator shall be monitored prior to combining with hydro wheel discharge.
009	New Outfall	Land application of paper mill sludge from Ahlstrom Mosinee on department-approved fields.
010	New Outfall (controlled diversion only)	At Sampling Point 010 (formerly 001A), process wastewater which has bypassed the secondary clarifier is sampled prior to discharge via Outfall 010. Outfall 010 is located on the east bank of the east channel of the Wisconsin River approximately 400 yards downstream from the U.S. Highway 153 bridge.
011	New Outfall	Sampling Point 011 represents the combined loadings from Outfalls 001 and 010.
106	N/A	Field blank to accompany mercury monitoring.
107	0.102 MGD (when discharging, 2016 - 2021)	Sampling point 107 will be used to report flow into the Holding Pond.
602	N/A	Downstream sampling point for monitoring to develop a site specific translator for dissolved copper limits. Sample point is located in the Wisconsin River at the Beans Eddy boat landing.

Sample Point Designation For Groundwater Monitoring Systems			
System	**Sample Pt Number**	**Well Name**	**Comments**
Holding Pond	801	OW-14 (801)	Upgradient: Background
	802	WP-14 (802)	Upgradient: Non-Point of Standard Well
	803	OW-101 (803)	Downgradient: Non-Point of Standard Well
	804	OW-101A (804)	Downgradient: Non-Point of Standard Well
	805	OW-104 (805)	Downgradient: Non-Point of Standard Well
	806	OW-107 (806)	Downgradient: Point of Standard Well
	807	OW-102 (807)	Downgradient: Point of Standard Well
	808	OW-102A (808)	Downgradient: Point of Standard Well

Changes from Previous Permit:

Sampling Point 601 (Untreated River Intake Water) has been removed as it is duplicative. Intake mercury sampling is now covered under Sampling Point 701.

Outfall 003 was removed as this NCCW outfall was abandoned.

Outfall 004 is changed to now be Outfall 005, as this is what Ahlstrom refers to this outfall within the plant itself. Outfall 004 within the plan represents the NCCW before it commingles with sump overflow, whereas Outfall 005 represents the true commingled outfall.

Outfall 009 has been added to track landspreading of industrial sludge.

Outfall 010 has been added for controlled diversion discharges from the outfall formerly known as 001A.

Wells OW-102, OW-107, and OW-102A are proposed to be the point of standard application wells, with OW-14 serving as the background well and WP-14, OW-101, OW-101A, OW-104 known as non-point of standard application wells.

1 Influent – Cooling Water Intake Structure - Proposed Monitoring

Sample Point Number: 701- MILL WATER INTAKE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Measure	
Intake Water Used Exclusively For Cooling		Percent	Annual	Calculated	
Mercury, Total Recoverable		ng/L	Quarterly	Grab	

Changes from Previous Permit

Water use from the facility's water intake includes process water and cooling water. There is a portion of the water withdrawn known as the "sump overflow" that is not used but is returned to the source water. The sump overflow is comingled with the cooling water prior to discharge to the source water. The permittee is now required to calculate and report annually the percentage of water withdrawn which is used exclusively for cooling purposes and the percentage that includes the sump overflow (comingled flow). Based on the department's review of the Mosinee Mill's intake system, the permittee is required to include sump overflow as 'cooling water' as long as it commingles with NCCW prior to discharge to the Wisconsin River.

Explanation of Limits and Monitoring Requirements

The Influent section includes the CWIS description, authorization for use, and BTA (Best Technology Available) determination. See Appendix C for full BTA determination.

The permittee is authorized to use the cooling water intake structure which consists of the following:

- Location: 44°47'27.1"N, 89°41'40.3"W.
- General Description: Water enters the structure via a 5'8" wide by 14'5" long inlet channel and flows into a settling chamber. At the end of the settling chamber, water passes through a bar rack which consist of ½" steel bars spaced 1 ¼" on center, here it flows by gravity through two concrete pipes (36" and 24"). Water is then pumped to the mill through a traveling screen with 3/8" openings prior to use as process and cooling water. Excess water withdrawn from the river is returned through a sump overflow weir and comingled with NCCW that is then discharged through Outfall 005.
- Maximum Design Intake Flow (DIF): 31.3 MGD (dependent on upstream river elevation)
- Maximum Through-Screen Design Intake Velocity: The through-screen design intake velocity at the point of withdrawal is 0.57 ft/s, but then increases to 4.24 and 4.97 ft/s in two pipes before entering the screen house, where the velocity is calculated to be 0.49 ft/s. See Appendix C.
    - **Bar Rack**: $V_{BR} = \frac{Q}{A*P} = \frac{30{,}000{,}000\frac{gal}{day} * \frac{1\ ft^3}{7.48\ gal} * \frac{1\ day}{86{,}400\ sec}}{13\ ft * 9.14\ ft * 0.72} = 0.57\ ft/s$

- **36" Pipe**: $V_{36"} = \frac{Q}{A*P} = \frac{22{,}700{,}000\frac{gal}{day}*\frac{1\,ft^3}{7.48\,gal}*\frac{1\,day}{86{,}400\,sec}}{\pi*\left(\frac{18\,inches}{12\frac{inches}{ft}}\right)^2*1} = 4.97\ ft/s$
- **24" Pipe**: $V_{24"} = \frac{Q}{A*P} = \frac{8{,}600{,}000\frac{gal}{day}*\frac{1\,ft^3}{7.48\,gal}*\frac{1\,day}{86{,}400\,sec}}{\pi*\left(\frac{12\,inches}{12\frac{inches}{ft}}\right)^2*1} = 4.24\ ft/s$
- **Screen House**: $V_{SH} = \frac{Q}{A*P} = \frac{31{,}300{,}000\frac{gal}{day}*\frac{1\,ft^3}{7.48\,gal}*\frac{1\,day}{86{,}400\,sec}}{2\ screens*10.5\ ft*5.67\ ft*0.83} = 0.49\ ft/s$

- Percent Used for Cooling: 56% (when sump overflow is included as part of the total)

In addition, the Department is requiring the submittal of an Alternatives Analysis Report for compliance with the entrainment BTA requirements. This additional submittal is required because, in making an entrainment BTA determination in future permit issuances, the department must consider the factors listed in s. NR 111.41(13)(a), Wis. Adm. Code, and may consider the criteria considered in s. NR 111.41(13)(b), Wis. Adm. Code. Even after receiving the application materials required in ss. NR 111.41(1) through (7) and (13), Wis. Adm. Code, the department does not expect to have sufficient information necessary to make an entrainment determination. Therefore, the Department requires the permittee to complete an Alternatives Analysis Report, in which the permittee 1) addresses narratively, at the least, the criteria in s. NR 111.41(13)(a), Wis. Adm. Code, 2) may address the criteria in s. NR 111.41(13)(b), Wis. Adm. Code, and 3) propose a technology, management practice, operational measure, or some combination thereof as a candidate for the Department's entrainment BTA determination. The analysis must evaluate, at a minimum, closed-cycle recirculating systems, fine mesh screens with a mesh size of 2mm or smaller, variable speed pumps, water reuse or alternate sources of cooling water, and any additional technology identified by the department at a later date.

Visual or Remote Inspections

The permittee is required to conduct visual or remote inspections of the intake structure at least weekly during periods of operation, pursuant to s. NR 111.14(4), Wis. Adm. Code.

Reporting Requirements

The permittee is required to submit an annual certification statement and report, pursuant to 40 CFR 125.97 (c).

Intake Screen Discharges and Removed Substances

Floating debris and accumulated trash collected on the cooling water intake trash rack shall be removed and disposed of in a manner to prevent any pollutant from the material from entering the waters of the State pursuant to s. NR 205.07 (3) (a), Wis. Adm. Code.

Endangered Species Act

This permit does not authorize take of threatened or endangered species. Contact the state Natural Heritage Inventory (NHI) staff with inquiries regarding incidental take of state-listed threatened and endangered species and the US Fish and Wildlife Service with inquiries regarding incidental take of federally-listed threatened and endangered species. There is now also a requirement to notify the department of any endangered species or lake sturgeon which are impinged.

2 Inplant - Proposed Monitoring and Limitations

Sample Point Number: 106- MERCURY FIELD BLANK

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Mercury, Total Recoverable		ng/L	Quarterly	Blank	

Changes from Previous Permit:

No changes.

Explanation of Limits and Monitoring Requirements

This Sampling Point is for the permittee to report the results of the field blank when taking mercury samples.

Sample Point Number: 107- Holding Pond

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		gpd	Daily	Total Daily	

Changes from Previous Permit:

No changes.

Explanation of Limits and Monitoring Requirements

This sampling point tracks the volume of discharge to the holding pond to show the permittee's flow trends over time. See Appendix E for the department's evaluation of the permittee's holding pond submittals from the previous permit term.

3 Surface Water - Proposed Monitoring and Limitations

Sample Point Number: 001- TREATED EFFLUENT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	5/Week	24-Hr Flow Prop Comp	BOD5 Monitoring is 5/Week November through April.
BOD5, Total		mg/L	Daily	24-Hr Flow Prop Comp	Daily monitoring is required May through October (only when discharging).
Suspended Solids, Total		mg/L	5/Week	24-Hr Flow Prop Comp	
Mercury, Total Recoverable	Daily Max	8.3 ng/L	Quarterly	Grab	
Temperature Maximum		deg F	Daily	Continuous	
Phosphorus, Total	Rolling 12 Month Avg	1.0 mg/L	Weekly	24-Hr Flow Prop Comp	
Copper, Total Recoverable	Daily Max	36 ug/L	Monthly	Grab	
Copper, Total Recoverable	Monthly Avg	36 ug/L	Monthly	Grab	
PFOA		ng/L	Monthly	Grab	
PFOS		ng/L	Monthly	Grab	
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See listed calendar quarters below.
Chronic WET	Monthly Avg	4.3 TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See listed calendar quarters below.

Changes from Previous Permit

The permittee is now required to report the concentration of BOD5 and TSS.

There is now a ‘Daily Max’ concentration-based effluent limitation of 8.3 ng/L for mercury.

‘Sample Frequency’ for total phosphorus has increased from ‘2/Month’ to ‘Weekly’.

Total Recoverable Copper daily max concentration limit is being lowered from 38 ug/L to 36 ug/L, and the daily max mass limit being adjusted from 3.9 lbs/day to 4.0 lbs/day (copper mass reported via Outfall 011). There is also now a monthly average copper concentration limit set equal to the daily maximum limit.

Monthly monitoring of PFOA and PFOS is now included.

A Chronic WET limit of 4.3 TUc is now included.

'Sample Frequency' is updated for Acute and Chronic WET testing from 'Quarterly' to 'See Listed Qtr(s)', though there is no change in monitoring frequency from the current permit (one quarter each year).

Explanation of Limits and Monitoring Requirements

Water Quality Based Limits and WET Requirements

Refer to the WQBEL memo (Appendix G) for the detailed calculations, prepared by the Water Quality Bureau dated 06/02/2022 used for this reissuance.

5-DAY BIOCHEMICAL OXYGEN DEMAND (BOD5)

See Outfall 011.

MERCURY

Because the 30-day P99 for mercury of effluent data from the previous permit term exceeds the wildlife health criterion of 1.3 ng/L, a mercury limit is necessary. A daily maximum mercury limit, set equal to the 1-day P99 (8.3 ng/L) of the receiving water data, is provided in this reissued permit.

TEMPERATURE

The facility has submitted thermal mixing zone studies for Outfall 001 on June 19, 2014. Based on the study findings, a mixing zone of 65% is allowed at Outfall 001 for calculating temperature limits. In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from May 2017 to April 2022. Based on this analysis, the permittee has no reasonable potential to exceed the calculated temperature limits.

See 'Antidegradation and Antibacksliding – Temperature Effluent Limitations for Outfalls 001 and 005' section below for the department's analysis of provisions in ch. NR 207, Wis. Adm. Code with regards to previous temperature limitations.

PHOSPHORUS

See Outfall 011.

COPPER

The permittee has reasonable potential to exceed the copper limitations calculated in accordance with s. NR 106.06, Wis. Adm. Code. The dissolved-based copper limits are shown in the table above. Expression of these limits as mass is required pursuant to s. NR 106.07, Wis. Adm. Code. Compliance with the dissolved-based copper limitations is compared directly to the Total Recoverable result that the permittee obtains from the laboratory as the conversion is already taken into account for the limitation in the permit.

The WQBEL memo had an error in calculating the reasonable potential, and the Weekly Average limitation was not triggered when re-doing the calculations based on data from the facility and data for the waterbody.

PFOS AND PFOA

NR 106 Subchapter VIII – *Permit Requirements for PFOS and PFOA Dischargers* became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for industrial dischargers to be evaluated on a case-by-case basis to determine if monitoring is required pursuant to s. NR 106.98(2)(d),

Wis. Adm. Code. The department evaluated the need for PFOS and PFOA monitoring taking into consideration industry type and other potential sources of PFOS or PFOA. Based on information available at the time the proposed permit was drafted, it was identified that this facility's industrial discharger category (pulp/paper manufacturer) may be a potential source of PFOS/PFOA.

WHOLE EFFLUENT TOXICITY

A chronic WET limit of 4.3 TUc is in the permit in accordance with the requirements in s. NR 106.08, Wis. Adm. Code, based on the number of toxicity detections from the previous permit term.

Whole effluent toxicity (WET) testing requirements and limits are determined in accordance with ss. NR 106.08 and NR 106.09 Wis. Adm. Code, as revised August 2016. (See the current version of the Whole Effluent Toxicity Program Guidance Document and checklist and WET information, guidance and test methods at http://dnr.wi.gov/topic/wastewater/wet.html)

Categorical Limits

See Outfall 011. Categorical limits are calculated in accordance with ch. NR 284, Wis. Adm. Code in Appendix B.

Sample Point Number: 005- PULP MILL NCCW

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Weekly	Total Daily	
Temperature Maximum		deg F	Daily	Continuous	
Chlorine, Total Residual	Daily Max	38 ug/L	Monthly	Grab	
Chlorine, Total Residual	Monthly Avg	38 ug/L	Monthly	Grab	

Changes from Previous Permit

This was previously identified as 'Outfall 004'. This was changed to '005' based on how the final outfall is referred to at the facility.

The final effluent temperature limits were removed based on new information.

A monthly average chlorine limit of 38 ug/L has been added.

Explanation of Limits and Monitoring Requirements

See Appendix G for a complete summary of all WQBEL calculations.

TEMPERATURE

The facility has submitted a thermal mixing zone study for Outfall 005 on May 1, 2020. Based on the study findings, a mixing zone of 100% is allowed at Outfall 005 for calculating temperature limits. Temperature limits for Outfall 005 are calculated using the combined flow rate from Outfalls 003 (now abandoned) and 005 and the flow-weighted average temperatures.

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code,

the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from May 2017 to April 2022.

See 'Antidegradation and Antibacksliding – Temperature Effluent Limitations for Outfalls 001 and 005' section below for the department's analysis of provisions in ch. NR 207, Wis. Adm. Code with regards to previous temperature limitations.

CHLORINE

Because chlorine is added to the water pumped to the plant and quenched prior to discharge at Outfall 005, effluent limitations are recommended to assure proper chlorine removal. Specifically, a daily maximum limit of 38 µg/L is required. Due to revisions to s. NR 106.07(2), Wis. Adm. Code, mass limitations are no longer required.

Revisions to chs. NR 106 and 205, Wis. Adm. Code align Wisconsin's water quality-based effluent limits with 40 CFR 122.45(d), which requires WPDES permits contain the following concentration limits, whenever practicable and necessary to protect water quality:

- Weekly average and monthly average limitations for continuous discharges subject to ch. NR 210.
- Daily maximum and monthly average limitations for all other discharges.

Ahlstrom is an industrial discharge and is therefore subject to daily maximum and monthly average limitations whenever limitations are determined to be necessary.

Sample Point Number: 007- HYDRO GENERATOR NCCW

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Quarterly	Estimated	
Temperature		deg F	Quarterly	Grab	
Copper, Total Recoverable	Daily Max	24 ug/L	Monthly	Grab	
Copper, Total Recoverable	Monthly Avg	24 ug/L	Monthly	Grab	
Copper, Total Recoverable	Daily Max	0.015 lbs/day	Monthly	Calculated	

Changes from Previous Permit

Dissolved-based copper limits are included.

Explanation of Limits and Monitoring Requirements

COPPER

The permittee has reasonable potential to exceed the copper limitations calculated in accordance with s. NR 106.06, Wis. Adm. Code. The dissolved-based copper limits are shown in the table above. Expression of these limits as mass is required pursuant to s. NR 106.07, Wis. Adm. Code. Compliance with the dissolved-based copper limitations is compared directly to the Total Recoverable result that the permittee obtains from the laboratory as the conversion is already taken into account for the limitation in the permit.

Sample Point Number: 008- FILTER BACKWASH

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Quarterly	Estimated	
Suspended Solids, Total		mg/L	Quarterly	Grab	

Changes from Previous Permit

No changes.

Explanation of Limits and Monitoring Requirements

TSS and flow monitoring are maintained to gauge the general effluent quality of the filter backwash stream.

Sample Point Number: 010- CONTROLLED DIVERSION OUTFALL

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	Monitoring required only when discharging.
BOD5, Total		mg/L	5/Week	Composite	BOD5 Monitoring is 5/Week November through April (only when discharging).
BOD5, Total		mg/L	Daily	Composite	Daily monitoring is required May through October (only when discharging).
Suspended Solids, Total		mg/L	5/Week	Composite	Monitoring required only when discharging.
Mercury, Total Recoverable	Daily Max	8.3 ng/L	Quarterly	Grab	Monitoring required only when discharging.
Temperature Maximum		deg F	Daily	Continuous	Monitoring required only when discharging.
Phosphorus, Total	Rolling 12 Month Avg	1.0 mg/L	Weekly	Composite	Monitoring required only when discharging.
Copper, Total Recoverable	Daily Max	36 ug/L	Monthly	Grab	Monitoring required only when discharging.
Copper, Total Recoverable	Monthly Avg	36 ug/L	Monthly	Grab	Monitoring required only when discharging.
PFOA		ng/L	Monthly	Grab	Monitoring required only

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					when discharging.
PFOS		ng/L	Monthly	Grab	Monitoring required only when discharging.

Changes from Previous Permit

New outfall for tracking discharges from routine controlled diversions.

Explanation of Limits and Monitoring Requirements

Previously this outfall was referred to as Outfall 001A. Sampling Points 001 and 010 are both located at the same spot, though Outfall 010 is physically located and discharged in a different location. The sampling requirements for this outfall are the same as 001, with the exception of WET Testing (given the temporary nature of these discharges).

Sample Point Number: 011- 001 + 010 COMBINED

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
BOD5, Total	Daily Max	6,534 lbs/day	5/Week	Calculated	BOD5 Monitoring is 5/Week November through April.
BOD5, Total	Monthly Avg	3,348 lbs/day	5/Week	Calculated	BOD5 Monitoring is 5/Week November through April.
BOD5, Total		lbs/day	Daily	Calculated	Daily monitoring is required May through October only.
Suspended Solids, Total	Daily Max	13,392 lbs/day	5/Week	Calculated	
Suspended Solids, Total	Monthly Avg	6,968 lbs/day	5/Week	Calculated	
Phosphorus, Total	Monthly Avg	90 lbs/day	Weekly	Calculated	
Phosphorus, Total		lbs/month	Monthly	Calculated	
Phosphorus, Total		lbs/yr	Monthly	Calculated	
Copper, Total Recoverable	Daily Max	4.0 lbs/day	Monthly	Calculated	
WLA Previous Day River Flow		cfs	Daily	Continuous	Monitoring is required May through October only.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
WLA Previous Day River Temp		deg F	Daily	Continuous	Monitoring is required May through October only.
WLA BOD5 Value		lbs/day	Daily	Calculated	Monitoring is required May through October only.
WLA BOD5 Discharged	Daily Max - Variable	lbs/day	Daily	Calculated	Monitoring is required May through October only.

Changes from Previous Permit

New outfall to track loadings from both Outfall 001 and Outfall 010 (previously 001A).

'Sample Type' for BOD5 and TSS mass loadings has been changed from '24-Hr Flow Prop Comp' to 'Calculated' to best reflect how the mass equivalents are obtained for reporting purposes.

The permittee is also now required to report monthly the previous month's combined total phosphorus mass loading (lbs/month), and the previous 12 months of combined total phosphorus mass loading (lbs/year) to show compliance with the Wisconsin River TMDL's wasteload allocation for this facility.

A monthly average mass limit of 90 lbs/day total phosphorus is now included.

Explanation of Limits and Monitoring Requirements

Water Quality-Based Effluent Limits:

5-DAY BIOCHEMICAL OXYGEN DEMAND (BOD5)

The permittee has a wasteload allocation for BOD5 in accordance with ch. NR 212, Wis. Adm. Code. Ahlstrom has applied for and has been granted an additional wasteload allocation from the now-closed Brokaw Mill in Maine, WI. The maximum wasteload allocation is set equal to the permittee's technology-based effluent limitation (TBEL) for BOD5. Daily monitoring is required when the allocation limits are effective, from May through October each year. See Appendix D for a summary of this process. Reporting of all BOD5 mass loadings shall be through Outfall 011, which is representative of discharges from both Outfall 001 and 010.

PHOSPHORUS

For the reasons explained in the April 30, 2012 paper entitled '*Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin*', WDNR has determined that it is impracticable to express the phosphorus WQBEL for the permittee as a maximum daily or weekly value. The final effluent limit for phosphorus is expressed as a monthly average. This final effluent limit was derived from and complies with the applicable water quality criterion.

Waste load allocations specified in TMDLs are expressed as WQBELs. The waste load allocated-derived WQBELs are consistent with the assumptions and requirements of the approved Wisconsin River Basin TMDL.

The proposed permit, as does the current permit, imposes a 12-month rolling average effluent limitation of 1 mg/L for phosphorus. Chapter NR 217, Wis. Adm. Code, specifies such a limit for industrial facilities that discharge more than 60 pounds of phosphorus per month.

Categorical limitations:

5-DAY BIOCHEMICAL OXYGEN DEMAND (BOD5)

For the months of November through April, BOD5 monitoring is 5 days/week and the TBELs are effective. These limits remain unchanged from current BOD5 limits in the WPDES permit. The BOD5 effluent limits are based on 1977 production rates.

TOTAL SUSPENDED SOLIDS

Monitoring for TSS is 5 days/week and the TBELs are effective year-round. These limits are calculated based on the average daily production numbers from 2017 – 2021. These limits remain unchanged from current TSS limits in the WPDES permit. TSS effluent limits are based on 1983-84 production.

Sample Point Number: 602- RECEIVING WATER TRANSLATOR

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Suspended Solids, Total		mg/L	Annual	Grab	
Copper, Total Recoverable		ug/L	Annual	Grab	
Copper Dissolved		ug/L	Annual	Grab	
Hardness, Total as CaCO3		ug/L	Annual	Grab	

Changes from Previous Permit

'Sample Frequency' has been reduced from '2/Year' to 'Annual'.

Explanation of Limits and Monitoring Requirements

Monitoring at this downstream location is required to ensure that the dissolved-based copper limit conversion remains accurate. The permittee is required to minimally sample this location for the above parameters annually, thus ensuring that at least four rounds of sampling occur during the permit term.

Antidegradation and Anti-backsliding – Temperature Effluent Limitations for Outfalls 001 and 005

The previous permit reissuance contained the following effluent limitations, which became effective 06/01/2021:

	Outfall 001		**Outfall 003 (ABANDONED)**		**Outfall 005 (formerly 004)**	
	Weekly Ave Limit (°F)	Daily Max Limit (°F)	~~Weekly Ave Limit (°F)~~	~~Daily Max Limit (°F)~~	Weekly Ave Limit (°F)	Daily Max Limit (°F)
Jan	-	-	~~49~~	~~76~~	-	-
Feb	-	-	~~50~~	~~76~~	-	-
Mar	-	-	~~52~~	~~76~~	-	-
Apr	-	-	~~55~~	~~78~~	-	-

	Outfall 001		Outfall 003 (ABANDONED)		Outfall 005 (formerly 004)	
	Weekly Ave Limit (°F)	Daily Max Limit (°F)	~~Weekly Ave Limit (°F)~~	~~Daily Max Limit (°F)~~	Weekly Ave Limit (°F)	Daily Max Limit (°F)
May	**84**	-	~~65~~	~~82~~	**79**	-
Jun	**96**	-	~~75~~	~~85~~	**89**	-
Jul	**100**	-	~~80~~	~~86~~	**94**	-
Aug	**104**	-	~~79~~	~~85~~	**95**	-
Sep	**101**	-	~~72~~	~~84~~	**91**	-
Oct	-	-	~~61~~	~~80~~	-	-
Nov	-	-	~~50~~	~~77~~	-	-
Dec	-	-	~~49~~	~~76~~	-	-

With Outfall 003 being abandoned, the department reviewed the applicable provisions for Outfalls 001 and 005 in ch. NR 207, Wis. Adm. Code.

ss. NR 207.12(1)(a)-(b), Wis. Adm. Code, is the general backsliding provision, which states:

"(1) GENERAL. Except as provided in this section, effluent limitations or standards in a reissued, revoked and reissued, or modified permit shall be at least as stringent as the effective effluent limitations or standards in the previous permit. If one of the exceptions in subs. (2) to (4) is satisfied to relax or backslide a limitation, the limitation may only be made less stringent if both of the following apply:

> *(a) The less stringent limitation is at least as stringent as required by the effluent limitation guideline in effect at the time the permit is reissued, revoked and reissued, or modified.*
>
> ***(b) The less stringent limitation complies with state water quality standards, including the antidegradation requirements in subch. I."***

There are specific exemptions to backsliding, which are contained in ss. NR 207.12(3)(b)1.-5., Wis. Adm. Code, they are:

"(b) Specific exceptions to backsliding prohibition. ***Any effective water quality based effluent limitations****, including those based upon a total maximum daily load or other wasteload allocation, or a limitation based on a state technology based treatment standard* ***may be relaxed in a reissued, revoked and reissued, or modified permit if sub. (1) (a) and (b) are satisfied and at least one of the following applies:***

> *1. Material and substantial alterations or additions to the permitted facility occurred after the limitation was initially imposed in the permit that justify the application of a less stringent effluent limitation.*
>
> ***2. New information is available that was not available at the time of permit issuance and that would have justified the application of a less stringent effluent limitation at the time of permit issuance. New information under this subdivision includes the establishment of an EPA approved total maximum daily load for the pollutant and receiving water. New information under this subdivision does not include revised regulations, guidance, or test methods. The relaxation of a water quality based effluent limitation under this subdivision that is based upon a revised wasteload allocation, a revised TMDL, or any alternative grounds for translating water quality standards into effluent limitations, is permissible only if the cumulative effect of the revised allocation results in a decrease in the amount of pollutants discharged into the receiving waters, and such revised allocations are not the result of a discharger completely or substantially eliminating its discharge of pollutants.***
>
> *3. A less stringent effluent limitation is necessary because of events over which the permittee has no control and for which there is no reasonable available remedy.*

4. The permittee has received department approval for any of the following:

a. A modified technology based limitation under s. 283.13 (3), Stats.

b. An extended compliance schedule under s. 283.13 (6), Stats.

c. A modified technology based limitation under a fundamentally different factors variance under ss. NR 220.30 to 220.33.

d. An alternative thermal effluent limitation under s. 283.17 (1), Stats.

5. The permittee has installed the treatment facilities required to meet the effluent limitations in the previous permit and has properly operated and maintained the facilities, but has nevertheless been unable to achieve the previous effluent limitations. In such a case, the effluent limitation in the reissued, revoked and reissued, or modified permit may be relaxed to reflect the level of pollutant control actually achieved. However, in no case may the limitation be less stringent than applicable effluent guidelines in effect at the time of reissuance or modification.

Note: These exceptions are listed in 33 USC 1342(o)(2).”

The permittee submitted a mixing zone study during the permit term, which the department incorporated into the calculation of the updated effluent limitations. With this ‘new information’ available, s. NR 207.12(3)(b)2., Wis. Adm. Code, is satisfied. To relax the effective effluent limitations, the antidegradation requirements outlined in ss. NR 207.04 and NR 207.05, Wis. Adm. Code, must be satisfied.

For reference, ss. NR 207.04(1)(a)-(b), Wis. Adm. Code states:

“(1) Application information. Persons proposing a new or increased discharge to fish and aquatic life waters shall provide documentation for the following:

(a) ***An assessment of existing treatment capability which demonstrates:***

1. Any of the following:

a. The permittee's discharge equals or exceeds 85% of any mass permit limitation.

b. The permittee's monthly average discharge equals or exceeds 85% of a monthly average effluent limitation established in a permit for 3 consecutive months;

c. The permittee's weekly average discharge equals or exceeds 85% of a weekly average effluent limitation established in a permit for 4 consecutive weeks.

d. The permittee's daily discharge equals or exceeds 85% of a daily maximum effluent limitation established in a permit 5 or more times during a calendar year;

e. There are exceedances of any daily maximum, weekly average or monthly average effluent limitation for a parameter in a permit; *or*

f. A municipal permittee's compliance maintenance annual report point total, as required in ch. NR 208, is 70 or greater;

2. The treatment facilities were maintained in good working order;

3. The treatment facilities were operated and maintained as efficiently as possible; and

4. The conditions documented in subd. 1. were not due to temporary upsets.

(b) Effluent quality data and background water quality data for indicator parameters so a determination will be made on whether or not a significant lowering of water quality will occur under s. NR 207.05*.”*

Based on the department’s review of temperature data reported by Ahlstrom during the previous permit term, it’s evident that there were not only several exceedances of the weekly average effluent limitations at Outfalls 001 and 005, but the

weekly average discharge temperature exceeded 85% of the limits for 4 or more consecutive weeks at both outfalls. During this time, it's also noted that the treatment facilities were maintained in good working order, operated and maintained as efficiently as possible, and the exceedances were not due to temporary upsets.

ss. NR 207.05(1)-(2), Wis. Adm. Code, outlines the procedure for determining whether relaxing the effluent limitations will result in a significant lowering of water quality. This is as follows:

"(1) Indicator parameters. For each proposed new or increased discharge the department shall determine a list of water quality parameters for which the significant lowering of water quality test will be applied. The list shall consist of:

(a) Biochemical oxygen demand/dissolved oxygen, ammonia-nitrogen, and copper; or

(b) Some other list of substances for which water quality criteria or secondary values have been determined according to chs. NR 102 to 105, not to exceed 10 parameters, which is determined to be representative of the discharge.

(2) Application information. Persons proposing a new or increased discharge shall use the following procedure to demonstrate to the department whether the discharge will result in a significant lowering of water quality:

(a) Determine the expected levels of the indicator parameters in the discharge.

(b) Determine existing levels of the indicator parameters upstream of, or adjacent to, the discharge site using applicable procedures in chs. NR 102 and 106 or specified by the department if none of those procedures apply. Existing levels shall be based on the earliest source of data after March 1, 1989 unless a demonstration is made that there has been a change in existing levels resulting in a change in the assimilative capacity of the receiving water, in which case the existing levels shall be based on the data used in the demonstration.

(c) Calculate expected levels in the receiving water of the indicator parameters as a result of the proposed new or increased discharge. In calculating expected levels in the receiving water, the following shall be used:

1. Applicable design low flow rates or dilution ratios for the receiving water in ch. NR 102 or 106 or specified by the department if none of those rates or ratios apply.

2. The daily average discharge loading rates for the new or increased portion of a municipal discharge or the yearly average discharge loading rates for the new or increased portion of an industrial discharge.

(d) Compare the expected levels in the receiving water of each indicator parameter as calculated in par. (c) to:

1. The assimilative capacity multiplied by one-third for all indicator parameters except dissolved oxygen; or

2. The sum of the existing level multiplied by two-thirds and the water quality criterion multiplied by one-third for dissolved oxygen."

The above-referenced procedure, as it pertains to temperature, is accomplished based on both the mixing zone study and the WQBEL memo. The Wisconsin River is not impaired for temperature (the only indicator parameter in this case) and the mixing zone study shows that temperature criteria are met outside the narrow mixing zone on the eastern shore of the Wisconsin River.

4 Groundwater – Proposed Monitoring and Limitations

4.1 Groundwater Monitoring System for Holding Pond

Location of Monitoring system: No Location

Wells to be Monitored: OW-14 (801), WP-14 (802), OW-101 (803), OW-101A (804), OW-104 (805), OW-107 (806), OW-102 (807), OW-102A (808)

Well Used To Calculate PALs: OW-14 (801)

Point of Standards Application Well(s): OW-102A (808), OW-102 (807), OW-107 (806)

Parameter	Units	Preventative Action Limit	Enforcement Standard	Frequency
Depth To Groundwater	feet	*****	N/A	1/ 6 Months
Groundwater Elevation	feet MSL	*****	N/A	1/ 6 Months
Nitrogen, Nitrite + Nitrate (as N) Dissolved	mg/L	2.0	10	1/ 6 Months
Chloride Dissolved	mg/L	125	250	1/ 6 Months
pH Field	su	8.0	N/A	1/ 6 Months
COD, Filtered	mg/L	35	N/A	1/ 6 Months
Nitrogen, Total Kjeldahl Dissolved	mg/L	*****	N/A	1/ 6 Months
Nitrogen, Ammonia Dissolved	mg/L	0.97	9.7	1/ 6 Months
Nitrogen, Organic Dissolved	mg/L	2.1	N/A	1/ 6 Months
Solids, Total Dissolved	mg/L	450	N/A	1/ 6 Months
Manganese Dissolved	ug/L	0.06	0.3	1/ 6 Months
BOD5, Total	mg/L	*****	N/A	1/ 6 Months
Iron Dissolved	mg/L	0.15	0.3	1/ 6 Months

Changes from Previous Permit:

Preventative Action Limit (PAL) of 2.1 mg/L has been established for Organic Dissolved Nitrogen.

Total Dissolved Solids PAL has been recalculated from 370 mg/L to 450 mg/L.

Manganese PAL has been recalculated from 0.025 to 0.06 ug/L.

Manganese ES has been recalculated from 0.05 to 0.3 ug/L.

Sampling for the following parameters is no longer required: pH Lab, Alkalinity, Hardness, Conductivity, Temperature, Sulfate, Boron, Copper, Zinc, Cadmium, Lead, Mercury, Sodium, TSS, Selenium, Arsenic, Barium, Chromium, Fluoride, and Silver.

Explanation of Limits and Monitoring Requirements

Groundwater limits and requirements are determined in accordance with ch. NR 140, Wis. Adm. Code. Indicator parameter Preventive Action Limit (PAL) values are established per s. NR 140.20 Wis. Adm. Code. See Appendix F for a complete explanation of all groundwater monitoring requirements.

For the previous reissuance, the department required that the permittee monitor for all pollutants which were from Tables 2, 3, and 4 of ch. NR 507 Appendix I, Wis. Adm. Code. Based on the department's review of the data provided during the previous permit term, only the above-identified parameters are required to be monitored and reported for as part of this WPDES permit. It is important to note that the exclusion of the identified parameters does not preclude any additional sampling requirements from the Waste and Materials Management Program at the department.

5 Land Application

Sample Point Number: 009- PAPER MILL SLUDGE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Quarterly	Grab Comp	
Nitrogen, Total Kjeldahl		Percent	Quarterly	Grab Comp	
Chloride		Percent	Quarterly	Grab Comp	
pH Field		su	Quarterly	Grab	
Nitrogen, Ammonia (NH3-N) Total		Percent	Annual	Grab Comp	
Phosphorus, Total		Percent	Annual	Grab Comp	
Phosphorus, Water Extractable		% of Tot P	Annual	Calculated	
Potassium, Total Recoverable		Percent	Annual	Grab Comp	
Dioxin, 2,3,7,8-TCDD Dry Wt		ng/kg	Annual	Grab Comp	
Dioxin, 2,3,7,8-TCDD TE		ng/kg	Annual	Calculated	
Furan, 2,3,7,8-TCDF Dry Wt		ng/kg	Annual	Grab Comp	
Lead Dry Wt		mg/kg	Annual	Grab Comp	
Zinc Dry Wt		mg/kg	Annual	Grab Comp	
Copper Dry Wt		mg/kg	Annual	Grab Comp	
Cadmium Dry Wt		mg/kg	Annual	Grab Comp	
Nickel Dry Wt		mg/kg	Annual	Grab Comp	
PCB Total Dry Wt		mg/kg	Once	Grab Comp	Sample once in 2026
PFOA + PFOS		ug/kg	Annual	Calculated	Sampling required every year, regardless of whether land application occurs.
Priority Pollutant Scan			Once	Grab Comp	Sampling required once in 2026, regardless of whether land application occurs. As specified in ch. NR 215.03

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					(1-6), Wis. Adm. Code (excluding asbestos). Use grab samples for mercury, cyanide and VOCs. Use composited grab samples for all other parameters.
Dioxins & Furans (all congeners)			Once	Grab Comp	Sampling required once in 2026, regardless of whether land application occurs. As specified in ch. NR
PFAS Dry Wt			Annual	Grab Comp	Sampling required every year, regardless of whether land application occurs.

Changes from Previous Permit:

This is a new sampling point to track the landspreading of pulp/paper mill sludge.

Explanation of Limits and Monitoring Requirements

s. NR 214.18(5), Wis. Adm. Code, states: *"The department may require in a WPDES permit that the sludge spreading discharge be monitored for total suspended solids, forms of nitrogen, chloride, metals or any other pollutant that may be present. The department shall select the pollutants to be monitored and the required frequency of monitoring on a case−by−case basis by considering the potential public health impacts, probable environmental impact, soil and geologic conditions, past operating performance, concentrations and characteristics of pollutants in the discharge and other relevant information."* This forms the basis for the following monitoring requirements.

QUARTERLY MONITORING REQUIRMENTS

Monitoring for Total Solids, TKN, Chloride, and pH is required on a Quarterly basis (when landspreading occurs in a given quarter; monitoring is not required if landspreading does not occur in a given quarter). Quarterly monitoring is appropriate for these parameters as they provide a basic characterization of the sludge being landspread.

- 'pH Field' means that a grab sample of pH should be taken prior to landspreading. pH should not be sampled for in the lab. pH monitoring ensures that the pH of the waste is appropriate for landspreading purposes.
- 'Total Solids' monitoring is important for waste characterization. This also ensures the permittee is reporting the solids results already obtained from the lab.
- 'TKN (Total Kjeldahl Nitrogen)' monitoring is required for calculation of application rates for nutrient tracking purposes.
- 'Chloride' monitoring is required to ensure the NR 214 chloride loading limit of 170 lbs/acre/year (or 340 lbs/acre/2 years) is not exceeded.

ANNUAL MONITORING REQUIREMENTS

Monitoring for Ammonia, Phosphorus, WEP (Water Extractable Phosphorus), Potassium, various metals (Lead, Zinc, Copper, Cadmium, Nickel), and Dioxin, 2,3,7,8-TCDD Toxic Equivalent, is required on an Annual basis (when landspreading occurs in a given year; monitoring is not required if landspreading does not occur in a given year). Annual reporting of dioxin loading is required if land application occurs (See 'Schedules' below). For PFAS (33 compounds; see listed compounds below), monitoring is required every year, regardless of whether landspreading occurs.

- Ammonia monitoring on an annual basis allows further tracking of nitrogen and characterization of the waste type.
- Phosphorus, WEP, and Potassium monitoring is essential for tracking nutrient densities from this waste.
    - Water extractable phosphorus (WEP) is the coefficient for determining plant available phosphorus from measured total phosphorus. In Wisconsin, the Penn State Method is utilized and is expressed in percent. While a total P may be significant, the WEP may show that only a small percentage of the P is available to plants because of factors such as treatment processes and chemical addition that "tie-up" phosphorus limiting the amount of phosphorus that is plant available. As part of the Wisconsin's nutrient management plan (NMP) requirements, the accounting of all fertilizers must be included over the NMP cycle. The fertilizer value of the waste needs to be communicated to the farmer and accounted for in the NMP.
- Metals (Lead, Zinc, Copper, Cadmium, Nickel) monitoring is proposed to track the specific metal loading rates on approved landspreading sites in accordance with the requirements of s. NR 214.18, Table 4, Wis. Adm. Code.

Table 4
Maximum Cumulative Cadmium, Copper, Lead, Nickel and Zinc Application for a Landspreading Site

Soil Cation Exchange Capacity (meq/100g)				
	Less than 5 lbs/ac	5–10 lbs/ac	10–15 lbs/ac	Greater than 15 lbs/ac
Lead	445	890	1,335	1,750
Zinc	225	445	670	890
Copper	110	220	335	445
Nickel	45	90	135	180
Cadmium				
Soil pH < 6.5	4.5	4.5	4.5	4.5
Soil pH ≥ 6.5	4.5	9.0	13.5	18

- Monitoring for the following per-and-polyfluoroalkyl substances (PFAS) is proposed on an annual basis:
    - PFBA (Perfluorobutanoic acid)
    - PFPeA (Perfluoropentanoic acid)
    - PFHxA (Perfluorohexanoic acid)
    - PFHpA (Perfluoroheptanoic acid)
    - PFOA (Perfluorooctanoic acid)
    - PFNA (Perfluorononanoic acid)
    - PFDA (Perfluorodecanoic acid)
    - PFUnA (Perfluoroundecanoic acid)
    - PFDoA (Perfluorododecanoic acid)
    - PFTrDA aka PFTriA (Perfluorotridecanoic acid)
    - PFTA aka PFTeDA (Perfluorotetradecanoic acid)
    - PFBS (Perfluorobutanesulfonic acid)
    - PFPeS (Perfluoropentanesulfonic acid)
    - PFHxS (Perfluorohexanesulfonic acid)
    - PFHpS (Perfluoroheptanesulfonic acid)
    - PFOS (Perfluorooctanesulfonic acid)

- PFNS (Perfluorononanesulfonic acid)
- PFDS (Perfluorodecanesulfonic acid)
- PFDoS (Perfluorododecanesulfonic acid)
- 4:2 FTS (4:2 fluorotelomersulfonic acid)
- 6:2 FTS (6:2 fluorotelomersulfonic acid)
- 8:2 FTS (8:2 fluorotelomersulfonic acid)
- PFOSA (Perfluorooctanesulfonamide)
- NMeFOSA (N-Methylperfluorooctanesulfonamide)
- NEtFOSA (N-Ethylperfluorooctanesulfonamide)
- NMeFOSAA (N-Methylperfluorooctanesulfonamidoacetic acid)
- NEtFOSAA (N-Ethylperfluorooctanesulfonamidoacetic acid)
- NMeFOSE (N-Methylperfluorooctanesulfonamidoethanol)
- NEtFOSE (N-Ethylperfluorooctanesulfonamidoethanol)
- HFPO-DA (Hexafluoropropylene oxide dimer acid)
- DONA (4,8-dioxa-3H-perfluorononanoic acid)
- 9Cl-PF3ONS aka F-53B Major (9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid)
- 11Cl-PF3OUdS aka F-53B Minor (11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid)

The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA is currently developing a risk assessment to determine future land application rates and expects to release this risk assessment by the end of 2024. In the interim, the department has developed the "Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS"

Collecting sludge data on PFAS concentrations from a wide range of wastewater treatment facilities will help protect public health from exposure to elevated levels of PFAS and determine the department's implementation of EPA's recommendations. To quantitate this risk, PFAS sampling has been included in the proposed WPDES permit pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9., Wis. Adm. Code.

'ONCE' PER PERMIT TERM (2026) MONITORING REQUIREMENTS

Monitoring for Total PCBs (polychlorinated biphenyls), Dioxins and Furans (all congeners) and a Priority Pollutant Scan are all required once during the permit term in 2026. Even if the permittee does not landspread in 2026, this permit still requires that a sample for the aforementioned parameters of the industrial sludge be collected, analyzed, and the results submitted at that time.

- Total PCBs is required as pulp/paper manufacturers are historical users of these compounds. This will allow the department to determine the health risks associated with this landspreading activity.
- Monitoring for all 17 congeners of Dioxins and Furans is required as pulp/paper manufacturers are historical users of these compounds. They're listed here:
  - 2,3,7,8−TCDD
  - 1,2,3,7,8−PeCDD
  - 1,2,3,4,7,8−HxCDD

  - 1,2,3,6,7,8−HxCDD
  - 1,2,3,7,8,9−HxCDD
  - 1,2,3,4,6,7,8−HpCDD
  - OCDD
  - 2,3,7,8−TCDF
  - 1,2,3,7,8−PeCDF
  - 2,3,4,7,8−PeCDF
  - 1,2,3,4,7,8−HxCDF
  - 1,2,3,6,7,8−HxCDF
  - 2,3,4,6,7,8−HxCDF
  - 1,2,3,7,8,9−HxCDF
  - 1,2,3,4,6,7,8−HpCDF
  - 1,2,3,4,7,8,9−HpCDF
  - OCDF
- A priority pollutant scan is required to adequately characterize this waste.

6 Schedules

6.1 Cooling Water Intake Structure - General

Required Action	Due Date
Annual Certification Statement: The permittee shall submit an Annual Certification on the intake structure, as required by s. 1.3.3.1 of this WPDES permit.	01/31/2025
Annual Certification Statement: The permittee shall submit an Annual Certification on the intake structure, as required by s. 1.3.3.1 of this WPDES permit.	01/31/2026
Annual Certification Statement: The permittee shall submit an Annual Certification on the intake structure, as required by s. 1.3.3.1 of this WPDES permit.	01/31/2027
Annual Certification Statement: The permittee shall submit an Annual Certification on the intake structure, as required by s. 1.3.3.1 of this WPDES permit.	01/31/2028
CWIS Application Materials Due: Unless an exemption has been authorized, the permittee shall submit the application materials required in s. NR 111.40(2)(c), Wis. Adm. Code by the Due Date.	09/30/2028
Annual Certification Statement: The permittee shall submit an Annual Certification on the intake structure, as required by s. 1.3.3.1 of this WPDES permit.	01/31/2029
Ongoing Annual Certification Statements: In the event this permit is not reissued by the expiration date and is administratively continued, the permittee shall continue to submit annual certification statements by January 31st of each year.	

6.2 Cooling Water Intake Structure - Modifications

The permittee shall take necessary steps to modify the intake structure to ensure that it is considered BTA for both impingement and entrainment mortality.

Required Action	Due Date
Preliminary Intake Evaluation: The permittee shall submit a preliminary evaluation of the intake structure, outlining the various compliance alternatives that are feasibly implemented during the permit term.	03/31/2025
Final Compliance Report: The permittee shall submit a report outlining the chosen impingement and entrainment compliance options for the intake structure.	03/31/2026
Begin Implementation: The permittee shall begin the necessary intake modifications to come into compliance with BTA requirements.	03/31/2027
Complete Intake Structure Modifications: The permittee shall complete the necessary modifications to the intake structure.	03/31/2028

6.3 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
Report on Effluent Discharge: Submit a report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations. This analysis should also include a comparison to the applicable narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code.	03/31/2025

This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.	
Report on Effluent Discharge and Evaluation of Need: Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results. The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan. If the Department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for Department approval no later than 90 days after written notification was sent from the Department. The Department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued. If, however, the Department determines there is no reasonable potential for the facility to discharge PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit.	03/31/2026

6.4 Holding Pond Response Actions

The permittee shall implement the actions identified below in accordance with s. NR 140.26, Wis. Adm. Code.

Required Action	Due Date
Preliminary Evaluation of Interim Actions: The permittee shall submit a report outlining all interim actions they plan to take in response to enforcement standard exceedances present in downgradient wells.	12/31/2024
Commence Interim Actions: The permittee shall commence interim actions by the Due Date.	03/31/2025
Engineering Evaluation of Abandonment and/or Dredging the Pond: The permittee shall provide an engineering evaluation on the future of the holding pond. This evaluation shall provide all of the following: a summary for the work necessary to complete dredging of the holding pond, a summary of the work necessary to fully abandon the holding pond in accordance with s. NR 213.07, Wis. Adm. Code, conclusions as to which action is preferable to the facility, and barriers to implementing either action. This evaluation must provide a conclusion as to which action the facility will begin to implement.	03/31/2026
Submit Abandonment Plan: If abandonment is chosen, the permittee shall submit an abandonment plan for department approval in accordance with s. NR 213.07, Wis. Adm. Code, by the Due Date.	09/30/2026
Dredging Report #1: If abandonment is not chosen, the permittee shall submit a report outlining the timeline for removing accumulated sludge from the holding pond.	03/31/2027
Submit New Holding Tank Plans & Specifications: If abandonment is chosen, the permittee shall submit for department review and approval the plans and specifications for the construction of a holding tank to aid in the abandonment of the existing holding pond in accordance with the requirements of chs. NR 108 and NR 213, Wis. Adm. Code.	03/31/2027

Commence Construction of New Holding Tank: If abandonment is chosen, the permittee shall commence construction of the new holding tank by the Due Date.	09/30/2027
Dredging Report #2: If abandonment is not chosen, the permittee shall provide an update on completing dredging activities.	03/31/2028
Abandonment Report #1: If abandonment is chosen, the permittee shall provide a status update on the abandonment of the holding pond.	03/31/2028
Interim Actions Report: The permittee shall submit a summary of the effectiveness of the interim actions that have been done during the permit term.	03/31/2029
Dredging Report #3: If abandonment is not chosen, the permittee shall provide an update on completing dredging activities.	03/31/2029
Abandonment Report #2: If abandonment is chosen, the permittee shall provide a status update on the abandonment of the holding pond.	03/31/2029
Dredging Report #4: If abandonment is not chosen, the permittee shall provide an update on completing dredging activities.	03/31/2030
Abandonment Report #3: If abandonment is chosen, the permittee shall provide a status update on the abandonment of the holding pond.	03/31/2030
Complete Dredging: If abandonment is not chosen, the permittee shall complete dredging by the Due Date.	03/31/2031
Complete Abandonment: If abandonment is chosen, the permittee shall complete abandonment by the Due Date.	03/31/2031

6.5 Total Dioxin Equivalents Loadings Report

By February 28th of each year, the permittee shall report the cumulative loading of total dioxin equivalents for each site that received sludge during the previous calendar year.

Required Action	Due Date
Annual Total Dioxin Equivalents Loading Report: The permittee shall report the cumulative loading of total dioxin equivalents for each site that received sludge during 2024. If no land application occurred, then this report is not required.	02/28/2025
Annual Total Dioxin Equivalents Loading Report: The permittee shall report the cumulative loading of total dioxin equivalents for each site that received sludge during 2025. If no land application occurred, then this report is not required.	02/28/2026
Annual Total Dioxin Equivalents Loading Report: The permittee shall report the cumulative loading of total dioxin equivalents for each site that received sludge during 2026. If no land application occurred, then this report is not required.	02/28/2027
Annual Total Dioxin Equivalents Loading Report: The permittee shall report the cumulative loading of total dioxin equivalents for each site that received sludge during 2027. If no land application occurred, then this report is not required.	02/28/2028
Ongoing Annual Total Dioxin Equivalents Loading Report: In the event that this permit is not reissued by the expiration date and is administratively continued, the permittee shall report the cumulative loading of total dioxin equivalents for each site that received sludge during the previous year. If no land application occurred, then this report is not required.	

6.6 Land Application Management Plan

A management plan is required for the land application system.

Required Action	Due Date
Land Application Management Plan: Submit an update to the management plan to optimize the land application system performance and demonstrate compliance with Wisconsin Administrative Code NR 214.	06/30/2024
Ongoing Management Plan Updates: The permittee shall submit updates to the department whenever there are changes in landspreading practices.	

Explanation of Schedules

INTAKE STRUCTURE – GENERAL REQUIREMENTS

The permittee is required to submit annual certifications which indicate that the intake structure is being maintained and operated as required by this permit. These certifications are a chance for the permittee to document any modifications to the intake structure as well.

Another requirement is the inclusion of a reminder to submit application materials 6 months prior to permit expiration.

INTAKE STRUCTURE -- MODIFICATIONS

The permittee is required to fully evaluate the compliance options necessary to meet the impingement and entrainment mortality standards in ch. NR 111, Wis. Adm. Code. The department recognizes that one potential result of the modifications would be reduction in cooling water usage to below 25%, thus not being subject to a full BTA determination. However, as Appendix C outlines, a BTA determination based on the department's best professional judgment would still be required, and the intake actions taken during this permit term should consider this determination.

PFOA/PFOS MINIMIZATION PLAN DETERMINATION OF NEED

As stated above, NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. S. NR 106.98, Wis. Adm. Code, specifies steps to generate data in order to determine the need for reducing PFOS and PFOA in the discharge. Data generated per the effluent monitoring requirements will be used to determine the need for developing a PFOS/PFOA minimization plan. As part of the schedule, the permittee is required to submit two annual Reports on Effluent Discharge.

If the department determines that a minimization plan is needed, the permit will be modified or revoked/reissued to include additional requirements.

HOLDING POND RESPONSE ACTIONS

After evaluating the reports submitted during the previous permit term, the department has determined that the permittee should remove the accumulated sludge in the holding pond, or abandon it altogether, to reduce anaerobic conditions. This will allow the department to review how this might impact groundwater quality in subsequent permit terms.

TOTAL DIOXIN EQUIVALENTS REPORTS

To document that total dioxin equivalents do not exceed established health-based soil profile values, the permittee is required to submit a report showing the cumulative loadings of total dioxin equivalents by 02/28 every year.

LAND MANAGEMENT PLAN

The permittee is required to develop and implement a management plan in accordance with s. NR 214.18(6)(c), Wis. Adm. Code. For reference, this management plan should fulfill the following requirements:

s. NR 214.18(6)(c), Wis. Adm. Code: "*The department shall require each sludge spreading system owner or operator to* ***submit a management plan for optimizing system performance and demonstrating compliance with the requirements of this chapter***. *Following approval by the department, the system shall be operated in conformance with the management*

plan. If the facility wishes to operate differently than specified in the approved plan, a written request shall be submitted to the department for approval to amend the management plan. ***The plan shall specify information on: sludge volumes and characteristics, beneficial or nondetrimental fertilizer or soil conditioner properties, production and pretreatment processes, description of all site limitations, vegetative cover control and removal, availability of storage, type of transportation and spreading vehicle, sludge application rates, load and rest schedules, contingency plans for periods of adverse weather, odor and nuisance abatement or any other pertinent information***."

Other Comments:

The following corrections should be noted when reviewing the attachments:

- Outfall 005 is referred to as Outfall 004 in the WQBEL Memo (Appendix G).
- The WQBEL Memo (Appendix G) indicates that the facility adds phosphorus in their WWTP process, this is not accurate as the facility no longer incorporates this practice.
- In the Groundwater Evaluation Memo (Appendix F), it states that the holding pond receives leachate. This is not accurate as the pond has ceased accepting landfill leachate as of 2020.

Attachments:

Appendix A: Summary of eDMR data, 2016 – 2021

Appendix B: Calculation of Technology-Based Effluent Limits

Appendix C: CWIS BTA Determination

Appendix D: BOD5 Reallocation Process

Appendix E: Holding Pond Evaluation

Appendix F: Groundwater Evaluation Memo

Appendix G: WQBEL Memo

Proposed Expiration Date:

03/31/2029

Prepared By:

Nate Willis, P.E.
Wastewater Engineer
Bureau of Water Quality

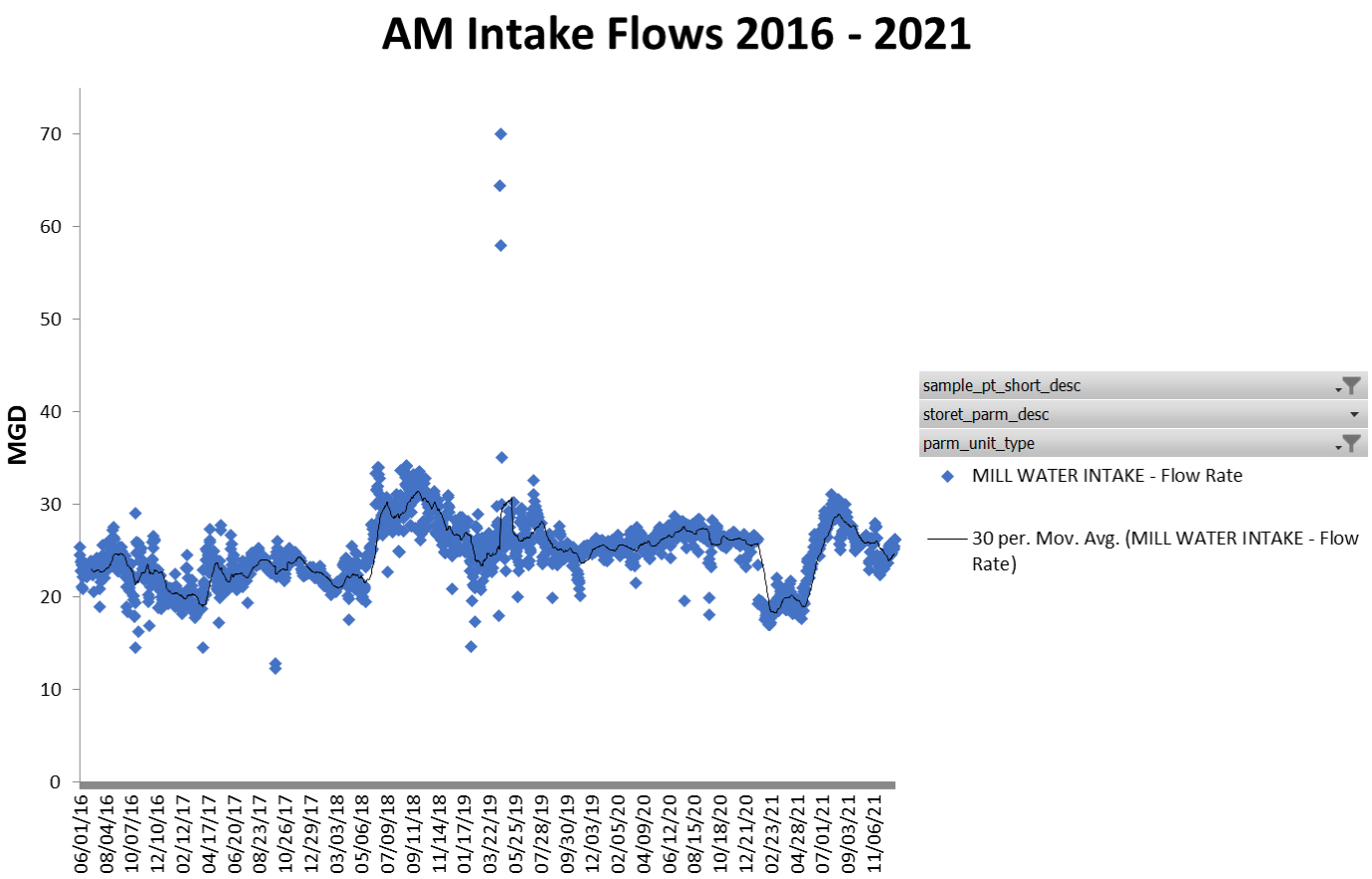
Date:

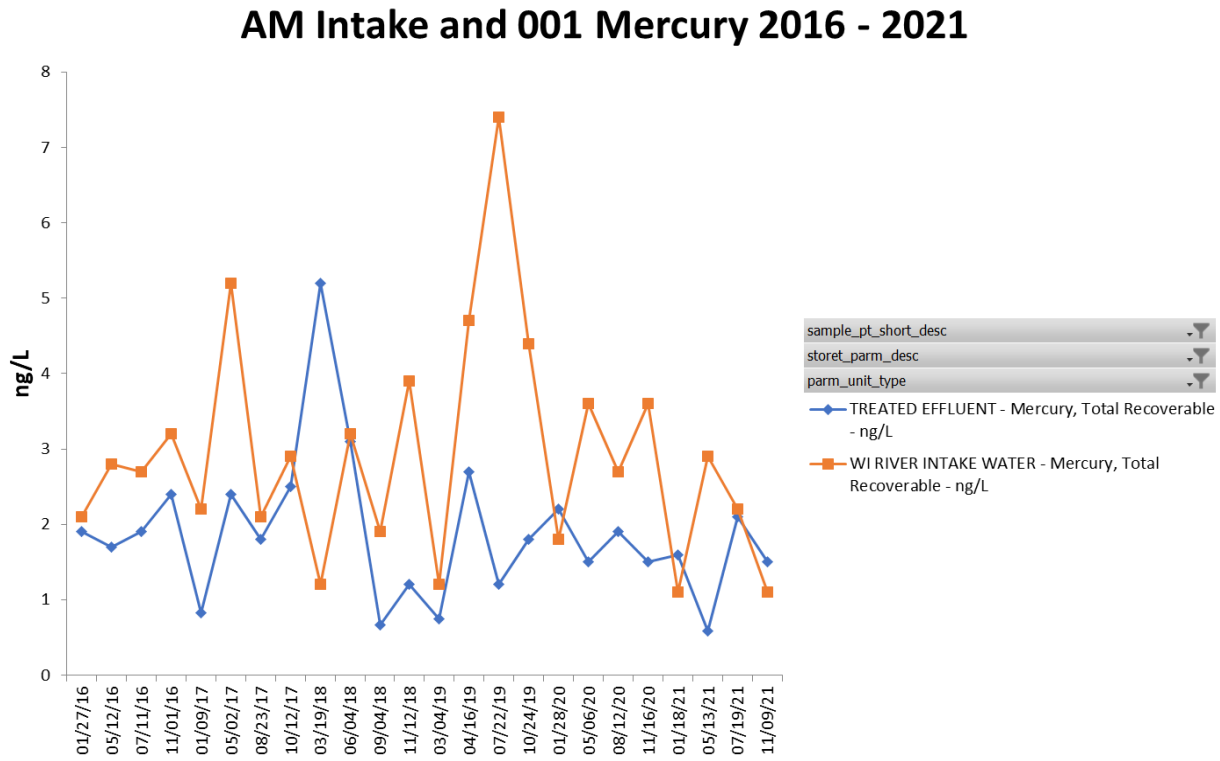
02/09/2023

APPENDIX A:

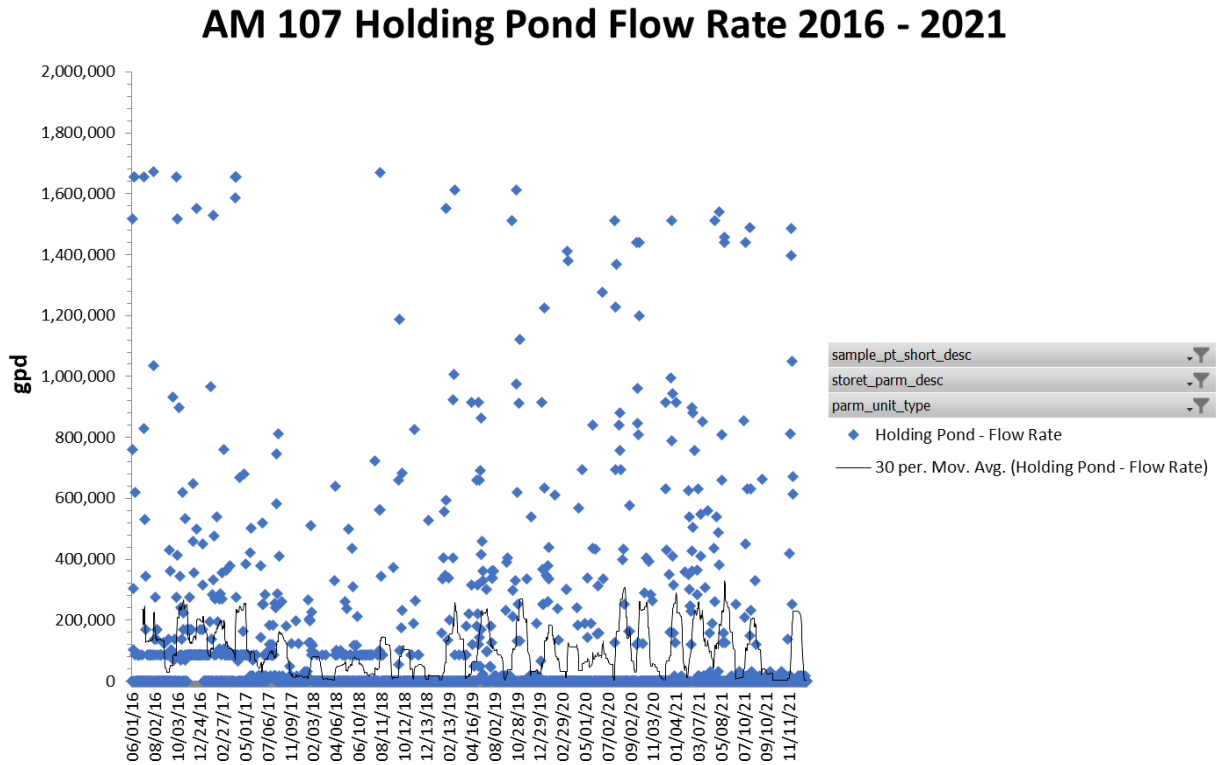
SUMMARY OF AHLSTROM EDMR DATA, 2016 – 2021

Intake Structure (Sampling Points 701 and 601):

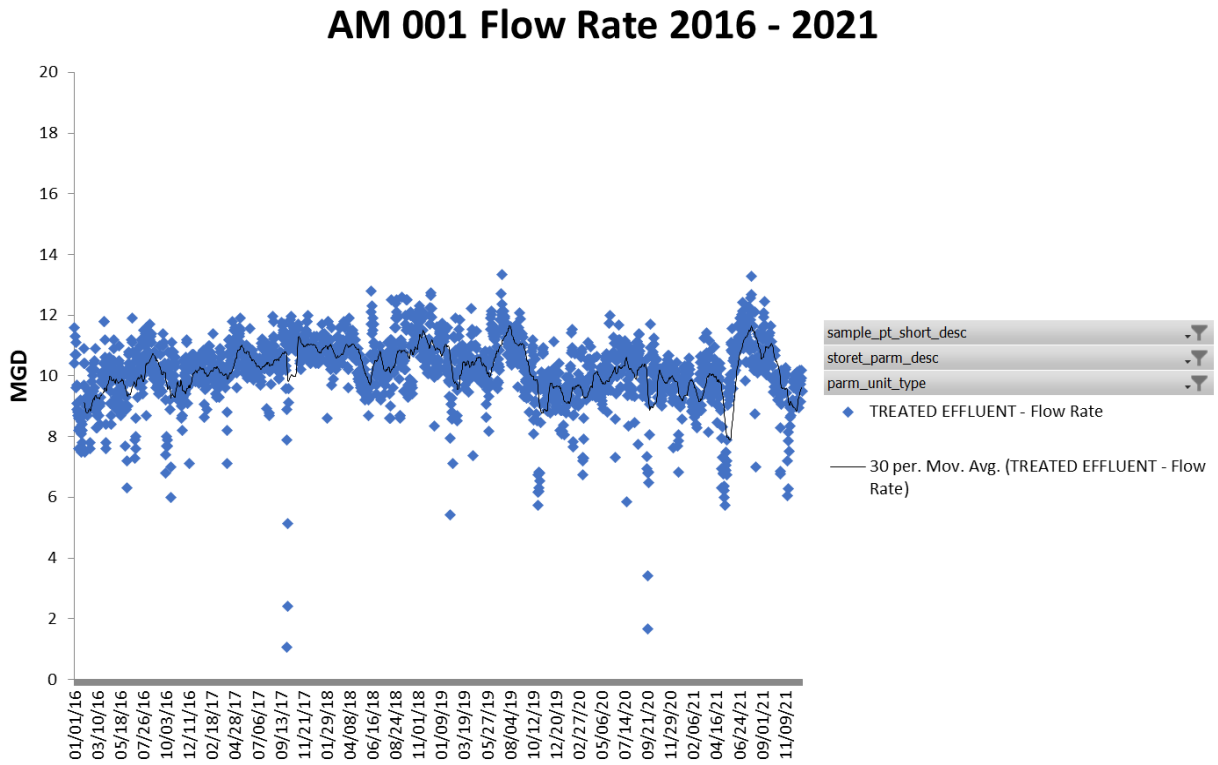


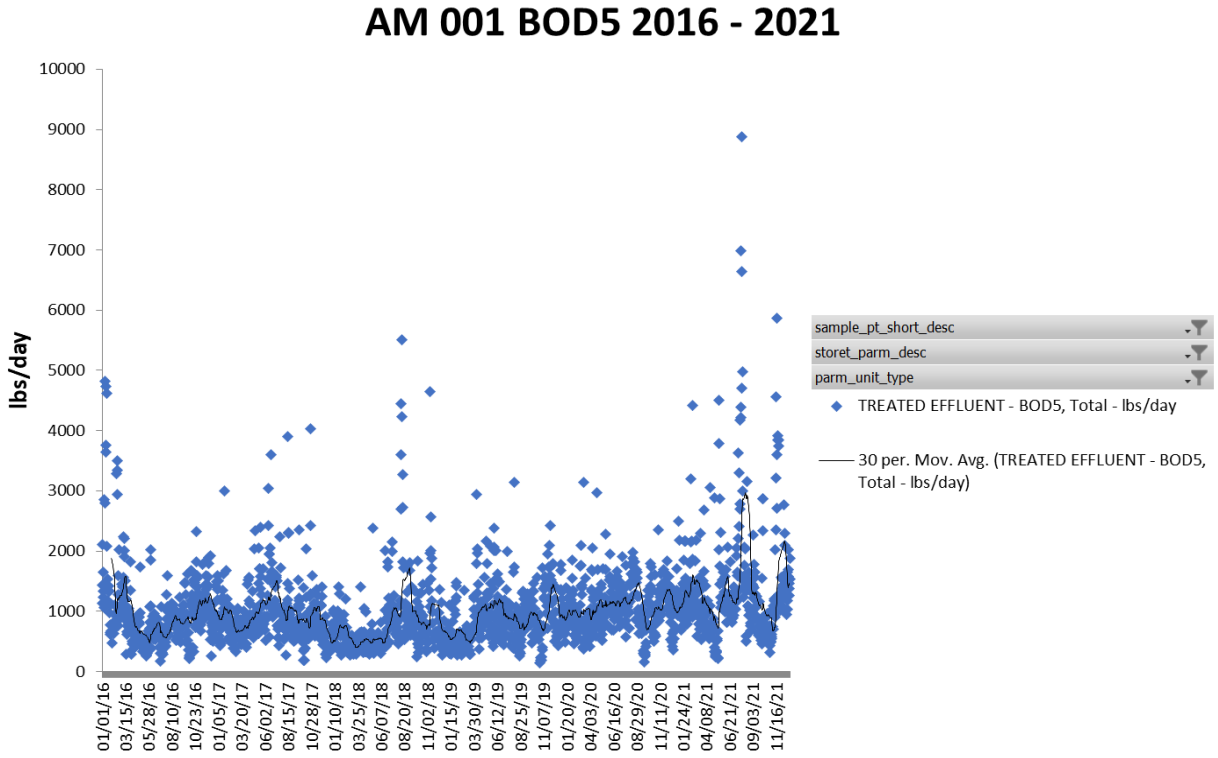


Sampling Point 107:

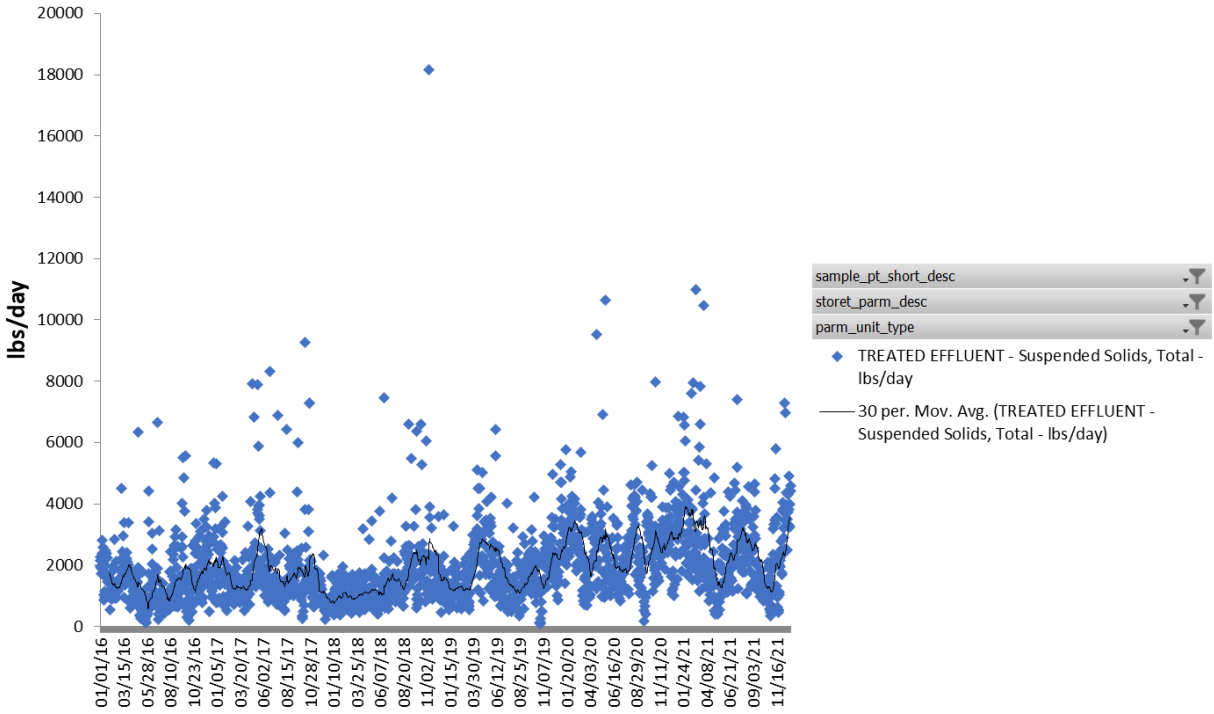


Outfall 001:

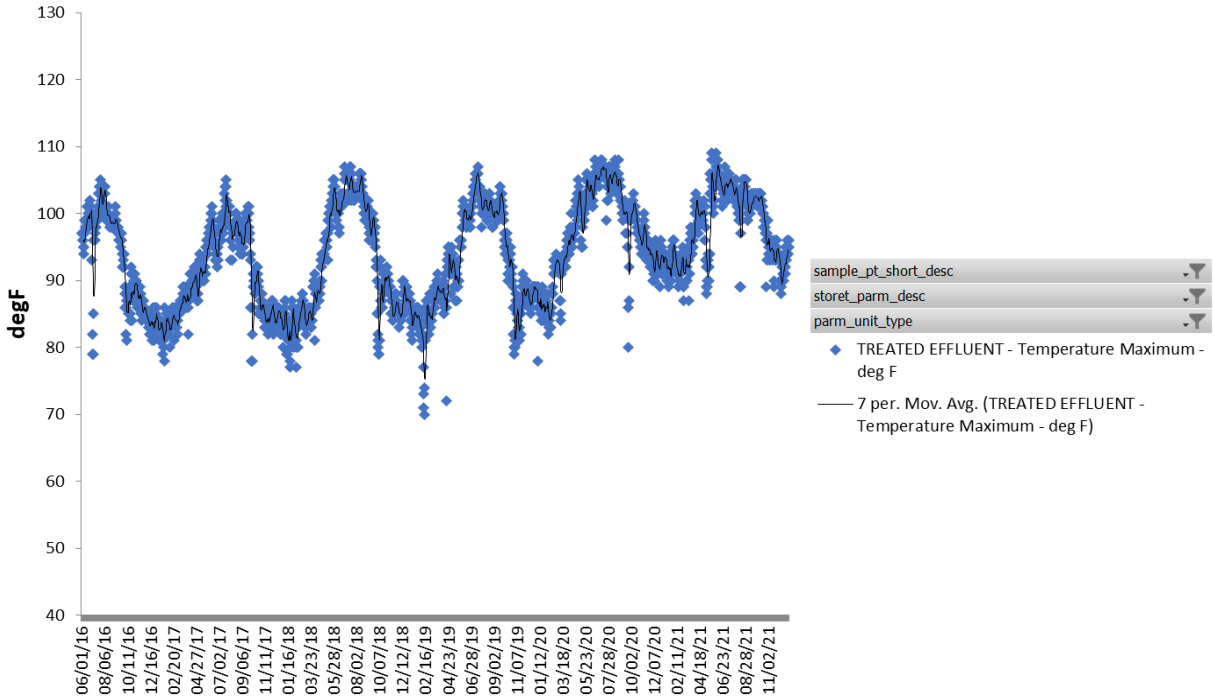

AM 001 Flow Rate 2016 - 2021
MGD
20
18
16
14
12
10
8
6
4
2
0
01/01/16
03/10/16
05/18/16
07/26/16
10/03/16
12/11/16
02/18/17
04/28/17
07/06/17
09/13/17
11/21/17
01/29/18
04/08/18
06/16/18
08/24/18
11/01/18
01/09/19
03/19/19
05/27/19
08/04/19
10/12/19
12/20/19
02/27/20
05/06/20
07/14/20
09/21/20
11/29/20
02/06/21
04/16/21
06/24/21
09/01/21
11/09/21
sample_pt_short_desc
storet_parm_desc
parm_unit_type
TREATED EFFLUENT - Flow Rate
30 per. Mov. Avg. (TREATED EFFLUENT - Flow Rate)


AM 001 BOD5 2016 - 2021
lbs/day
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
01/01/16
03/15/16
05/28/16
08/10/16
10/23/16
01/05/17
03/20/17
06/02/17
08/15/17
10/28/17
01/10/18
03/25/18
06/07/18
08/20/18
11/02/18
01/15/19
03/30/19
06/12/19
08/25/19
11/07/19
01/20/20
04/03/20
06/16/20
08/29/20
11/11/20
01/24/21
04/08/21
06/21/21
09/03/21
11/16/21
sample_pt_short_desc
storet_parm_desc
parm_unit_type
TREATED EFFLUENT - BOD5, Total - lbs/day
30 per. Mov. Avg. (TREATED EFFLUENT - BOD5, Total - lbs/day)

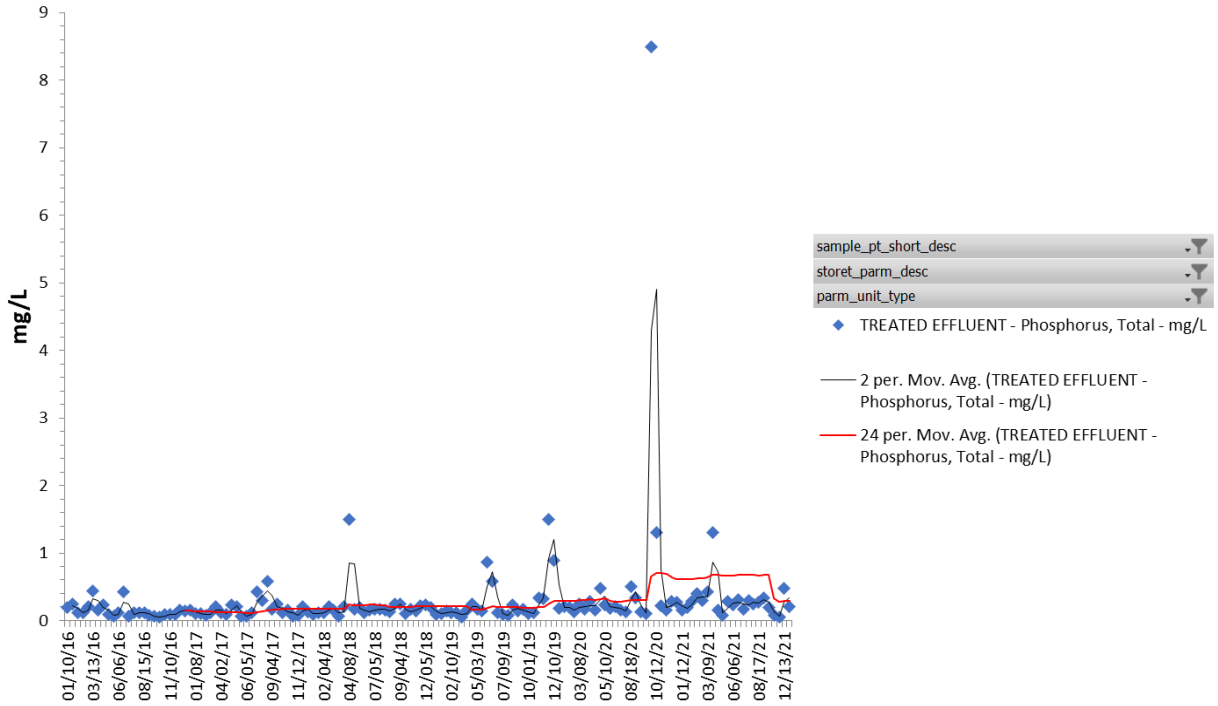
AM 001 TSS 2016 - 2021



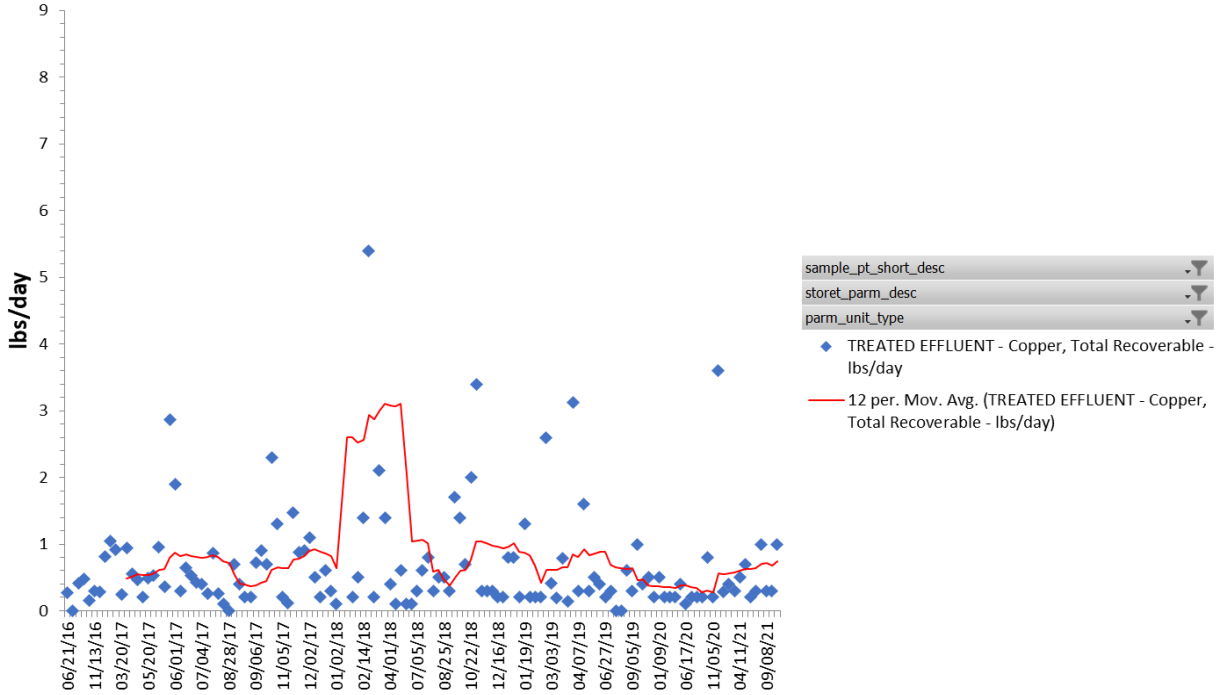
AM 001 Maximum Temperature 2016 - 2021



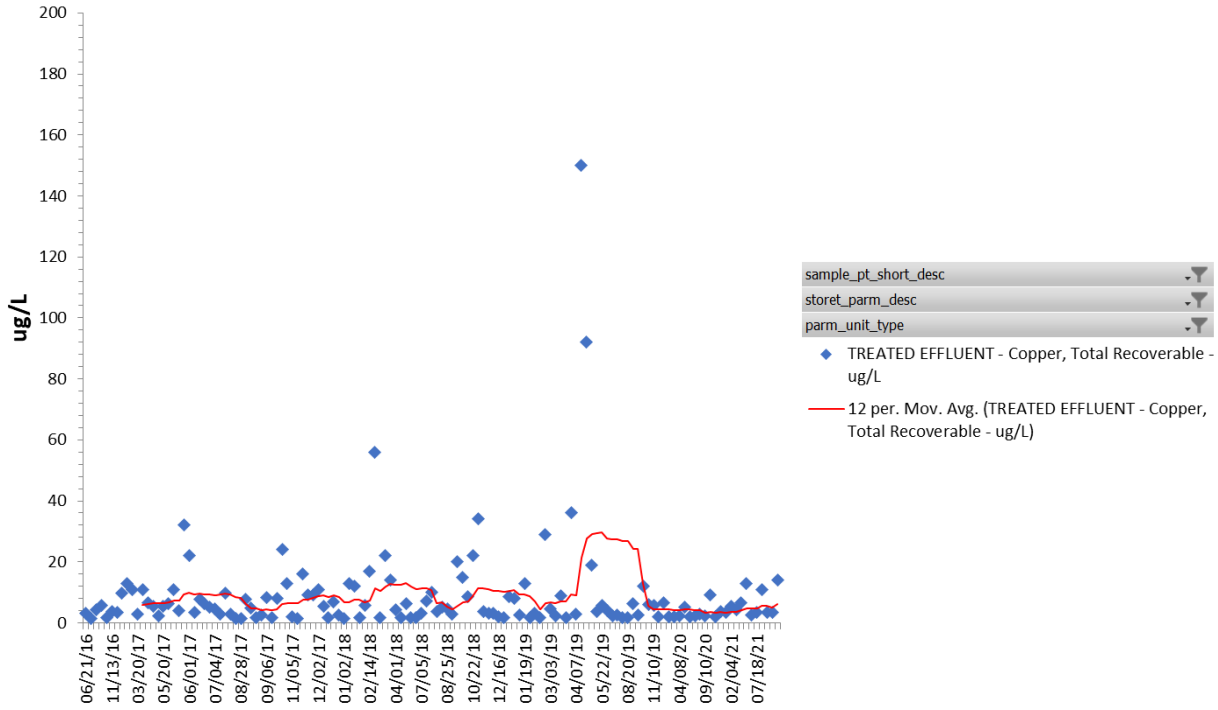
AM 001 Phosphorus 2016 - 2021



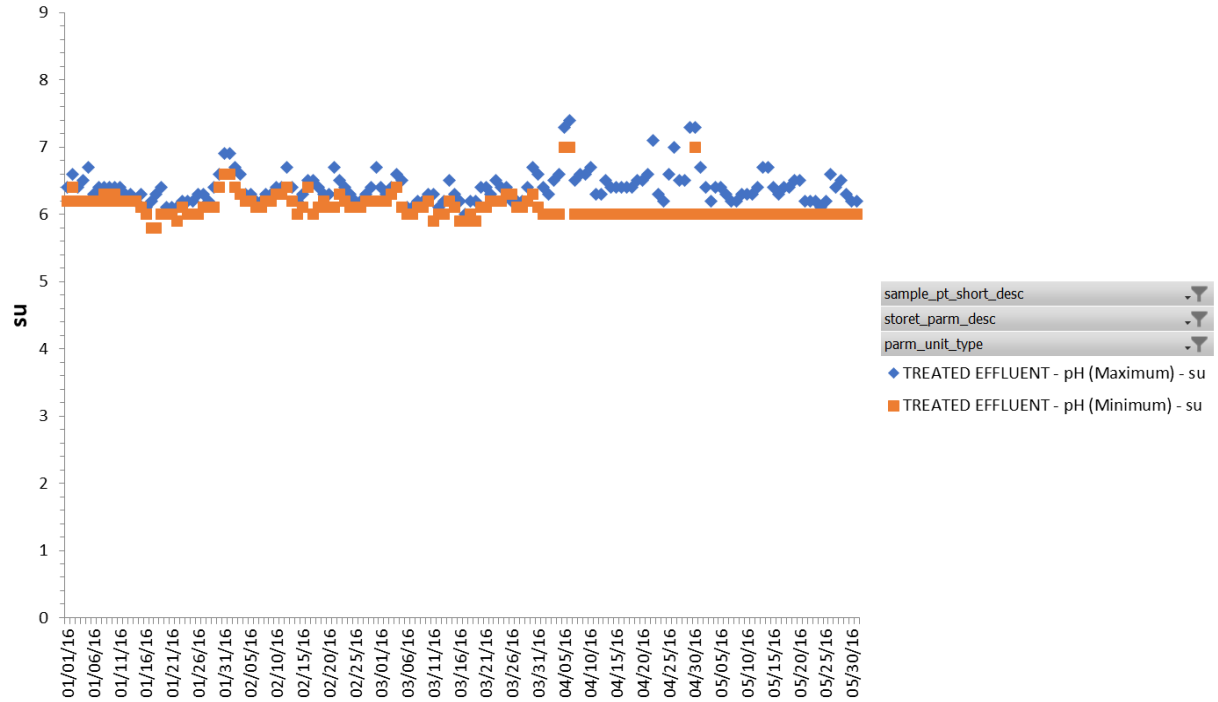
AM 001 Copper (mass) 2016 - 2021



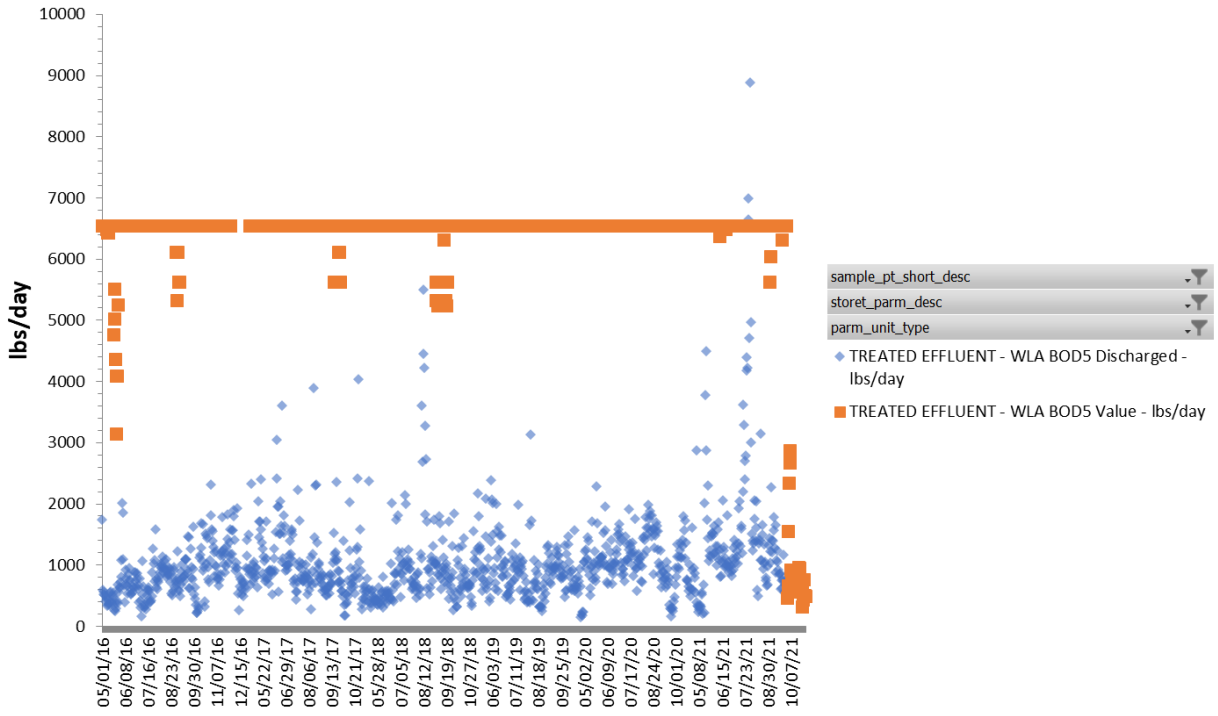
AM 001 Copper (concentration) 2016 - 2021



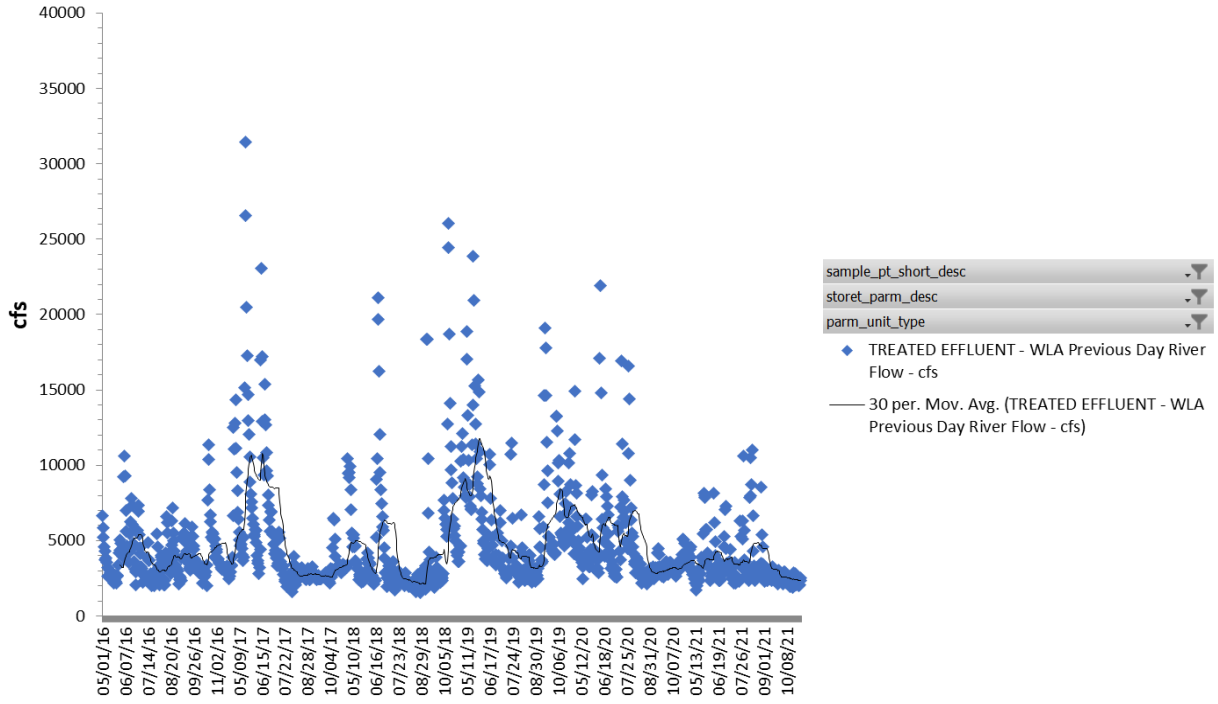
AM 001 pH 2016 - 2021

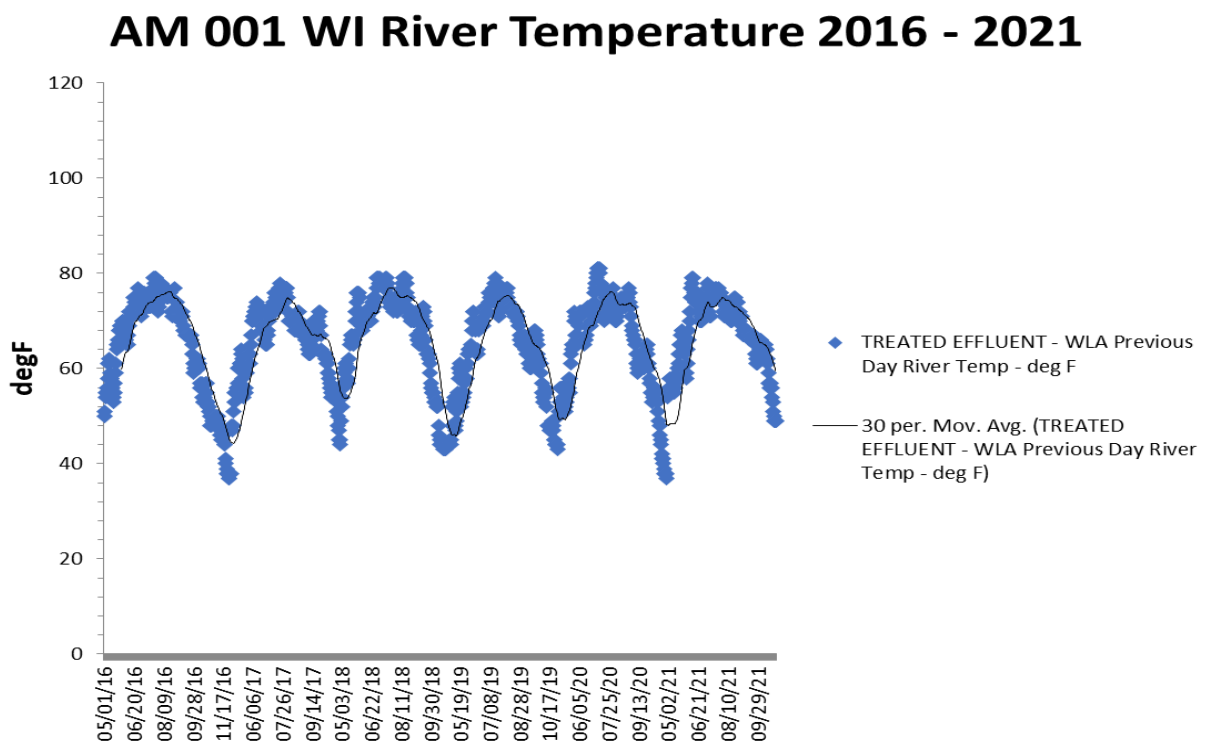


AM 001 BOD5 WLA Values 2016 - 2021

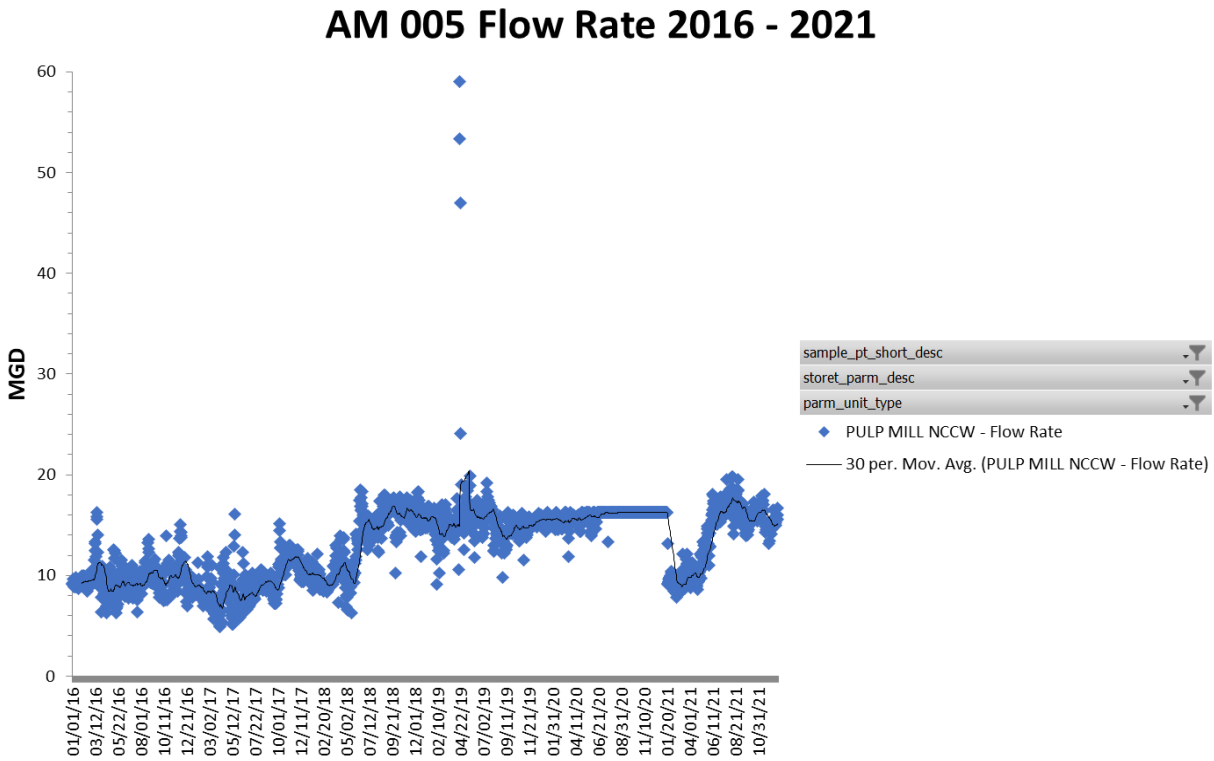


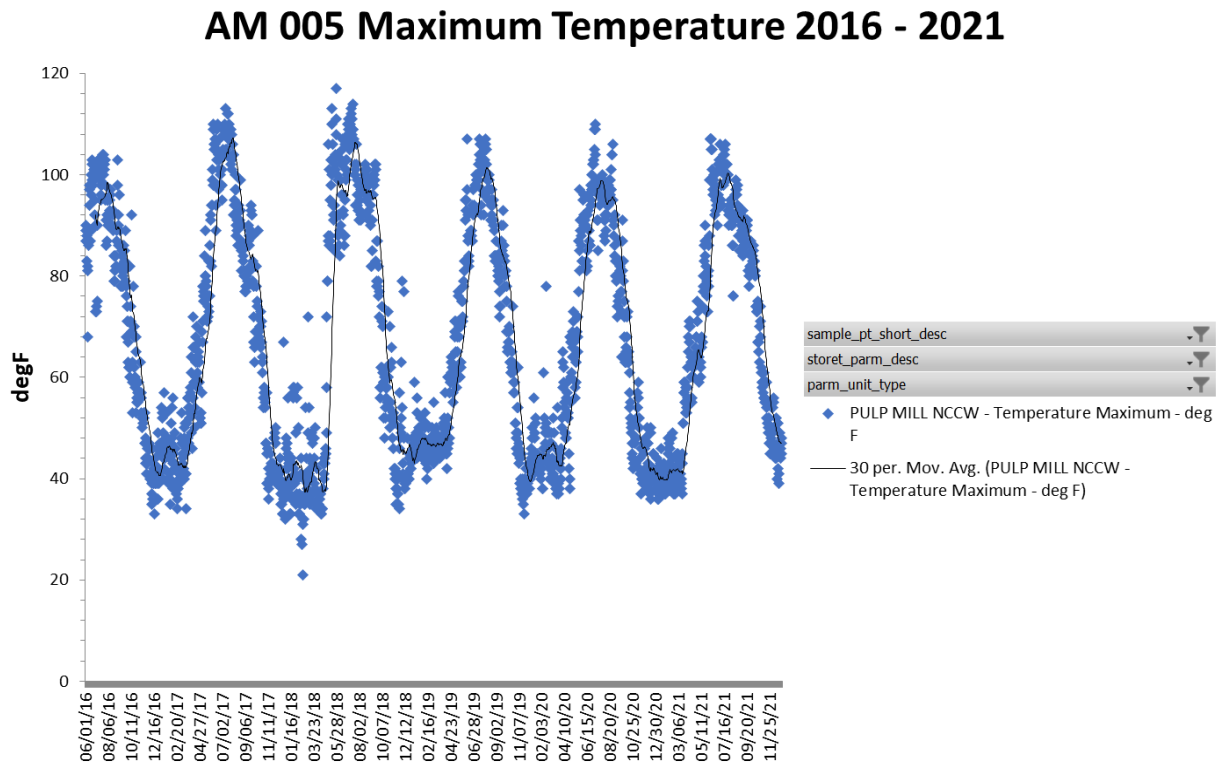
AM 001 WI River Flow 2016 - 2021



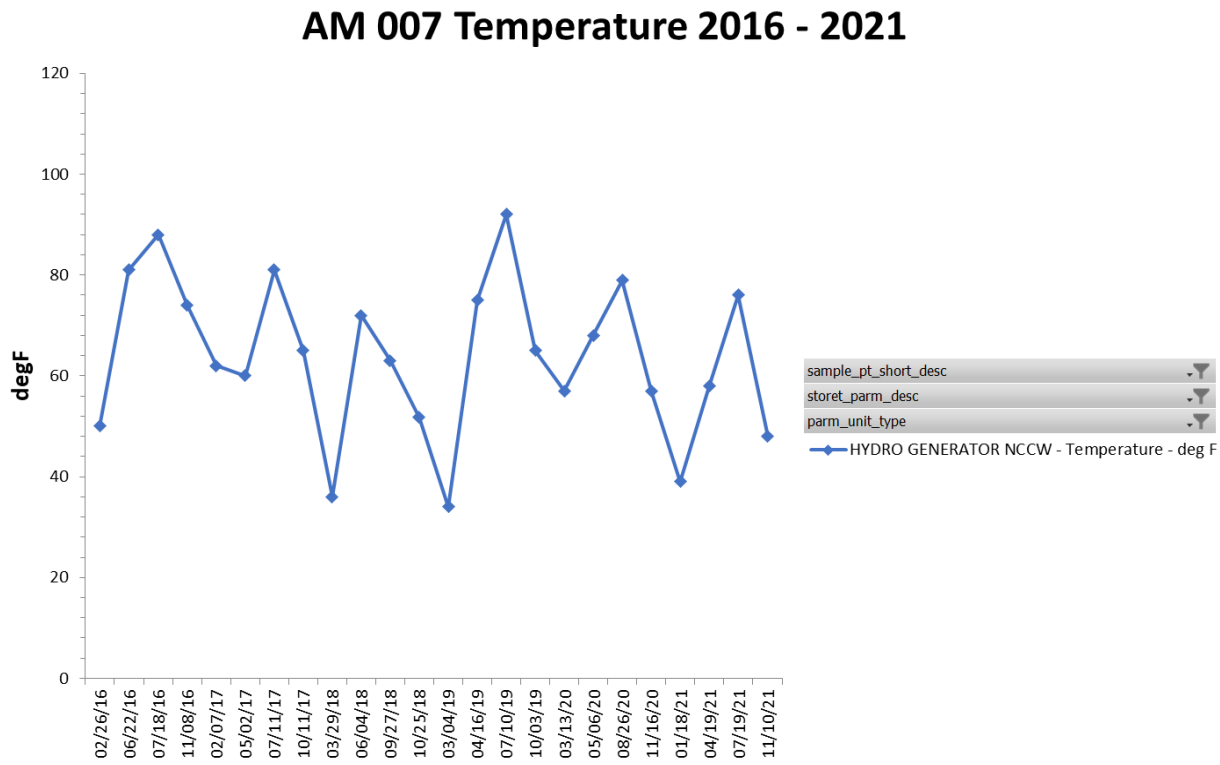


Outfall 005 (previously 004):

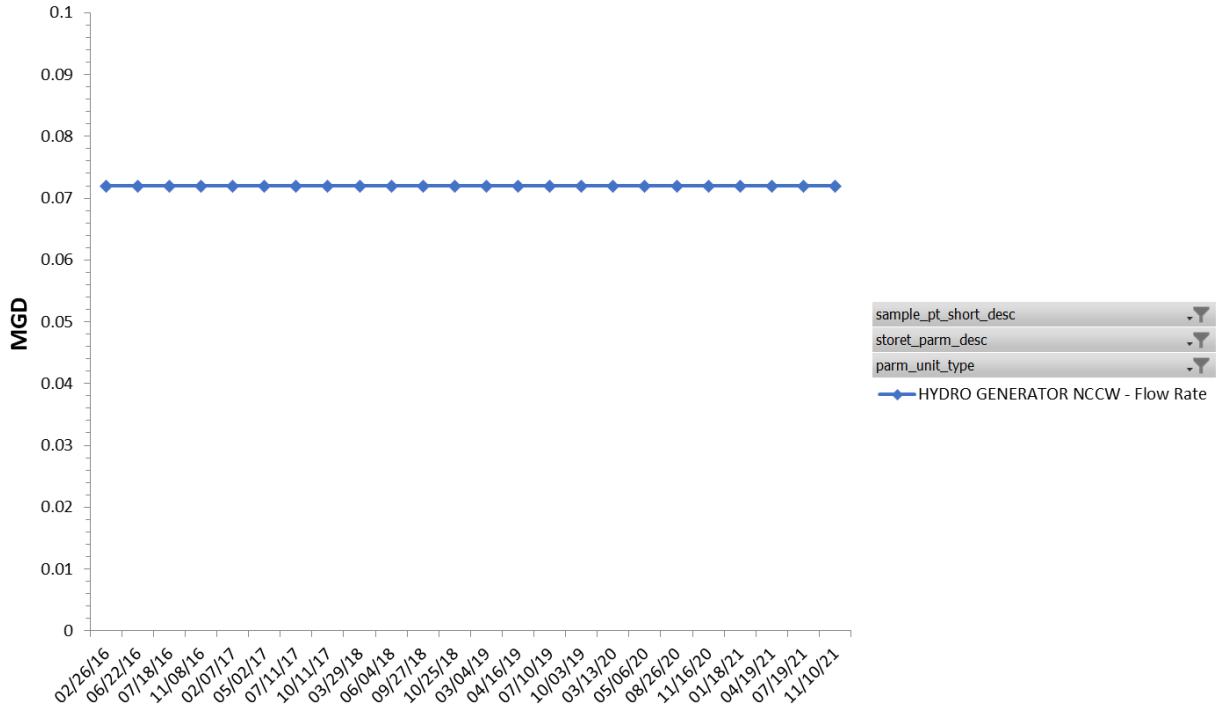



AM 005 Maximum Temperature 2016 - 2021
degF
120
100
80
60
40
20
0
06/01/16
08/06/16
10/11/16
12/16/16
02/20/17
04/27/17
07/02/17
09/06/17
11/11/17
01/16/18
03/23/18
05/28/18
08/02/18
10/07/18
12/12/18
02/16/19
04/23/19
06/28/19
09/02/19
11/07/19
02/03/20
04/10/20
06/15/20
08/20/20
10/25/20
12/30/20
03/06/21
05/11/21
07/16/21
09/20/21
11/25/21
sample_pt_short_desc
storet_parm_desc
parm_unit_type
PULP MILL NCCW - Temperature Maximum - deg F
30 per. Mov. Avg. (PULP MILL NCCW - Temperature Maximum - deg F)

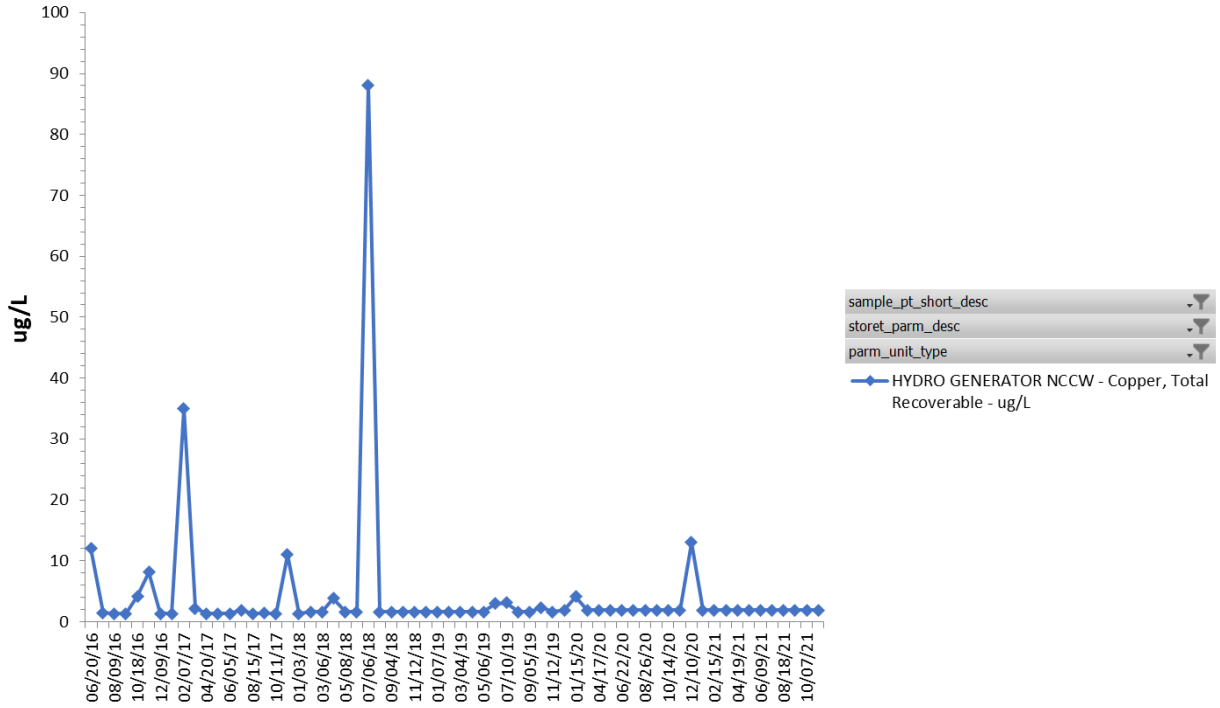
Outfall 007:


AM 007 Temperature 2016 - 2021
degF
120
100
80
60
40
20
0
02/26/16
06/22/16
07/18/16
11/08/16
02/07/17
05/02/17
07/11/17
10/11/17
03/29/18
06/04/18
09/27/18
10/25/18
03/04/19
04/16/19
07/10/19
10/03/19
03/13/20
05/06/20
08/26/20
11/16/20
01/18/21
04/19/21
07/19/21
11/10/21
sample_pt_short_desc
storet_parm_desc
parm_unit_type
HYDRO GENERATOR NCCW - Temperature - deg F

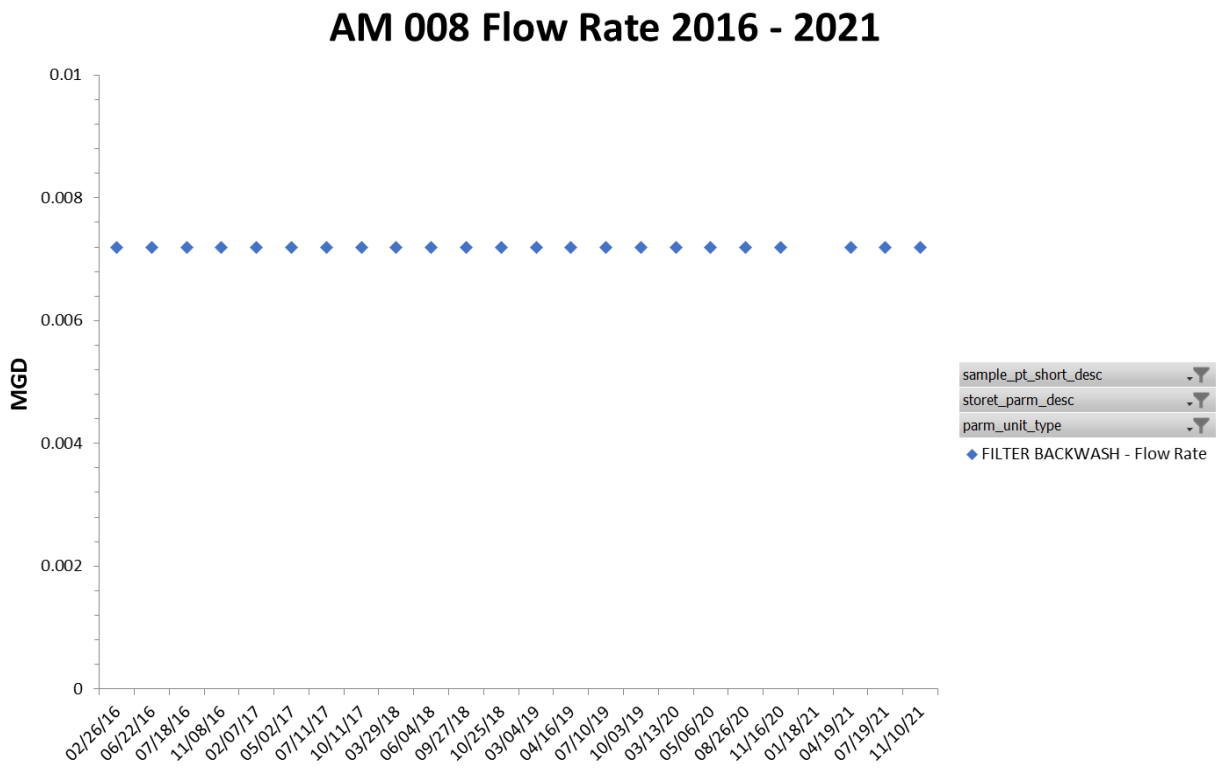
AM 007 Flow Rate 2016 - 2021

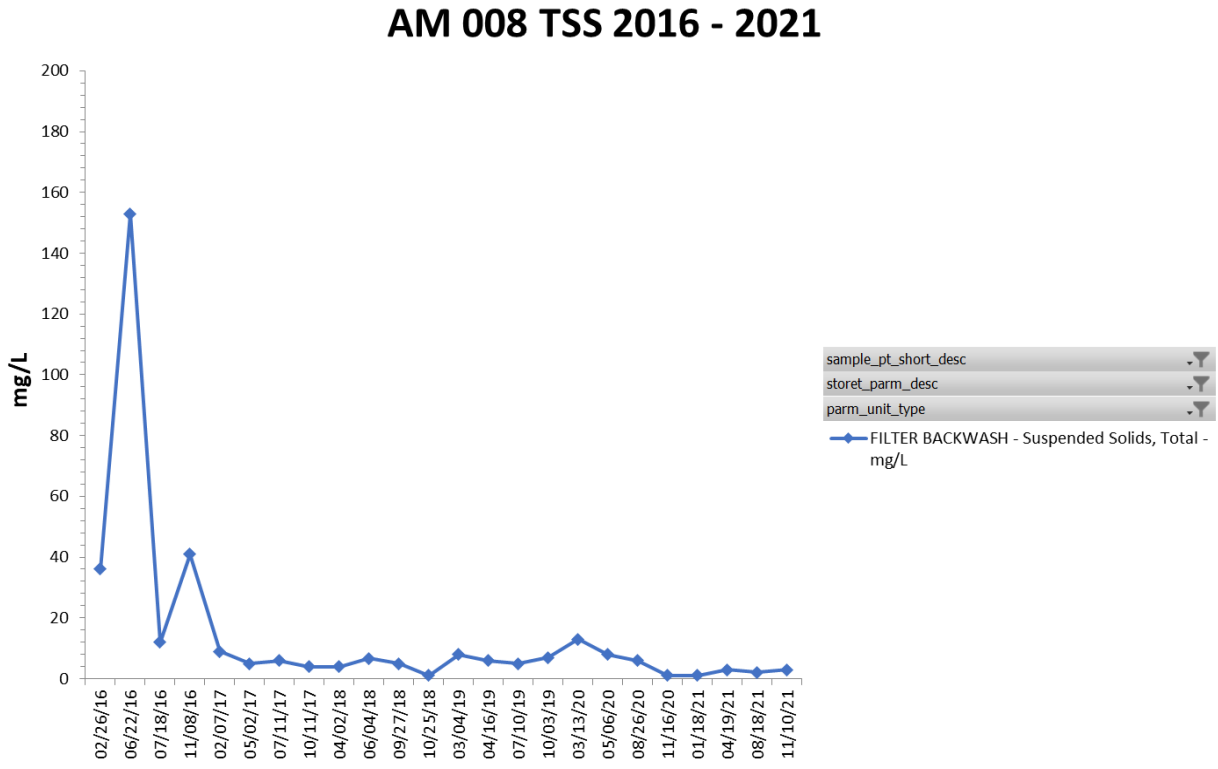


AM 007 Copper 2016 - 2021

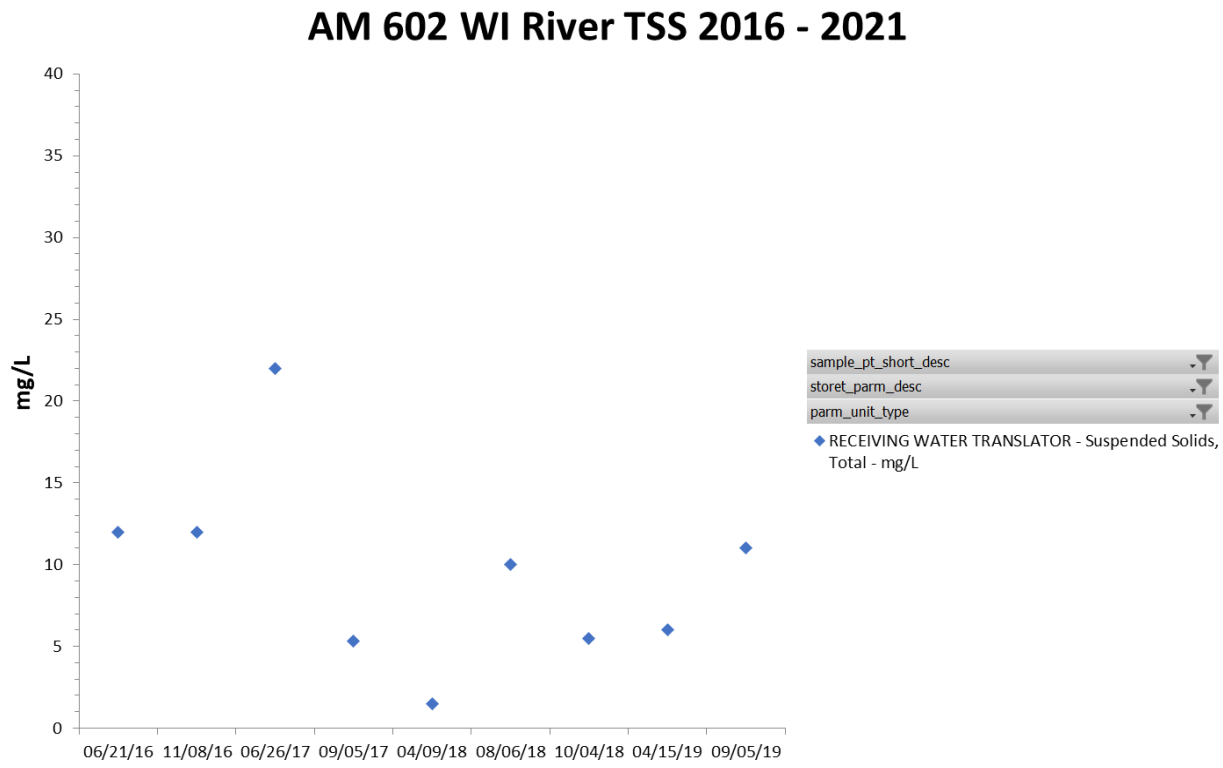


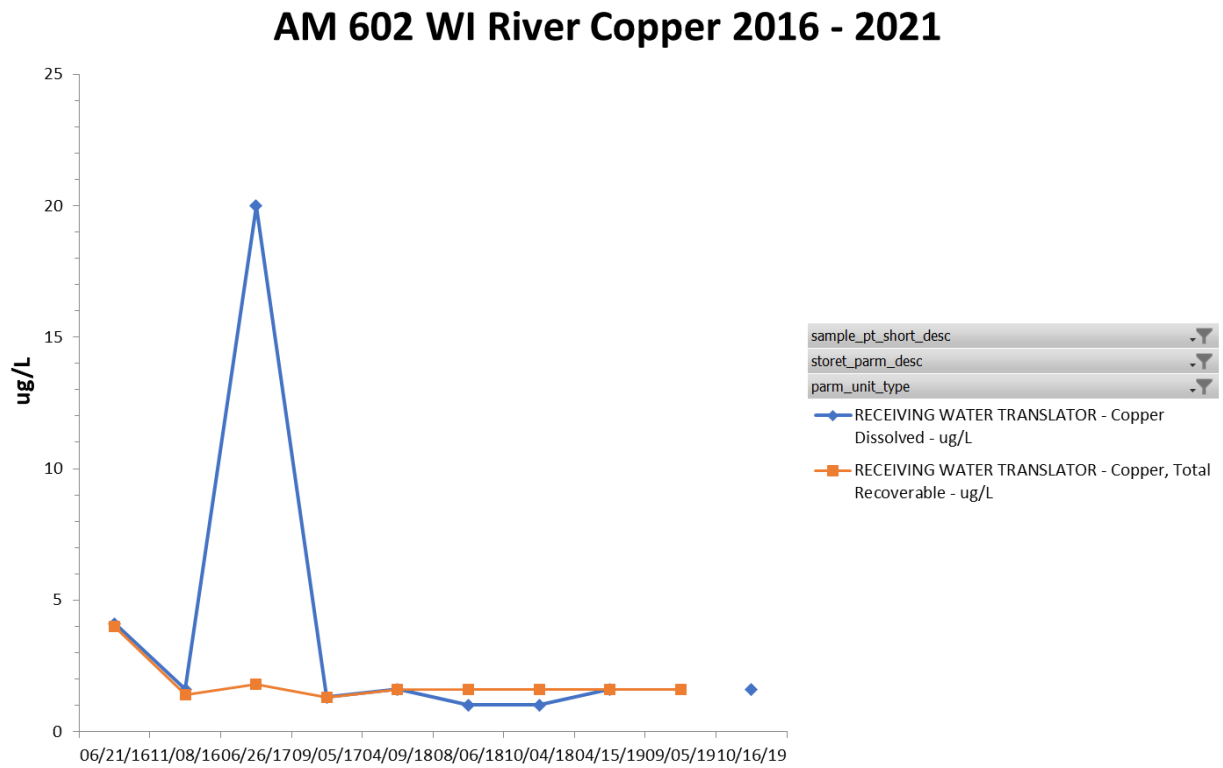
Outfall 008:

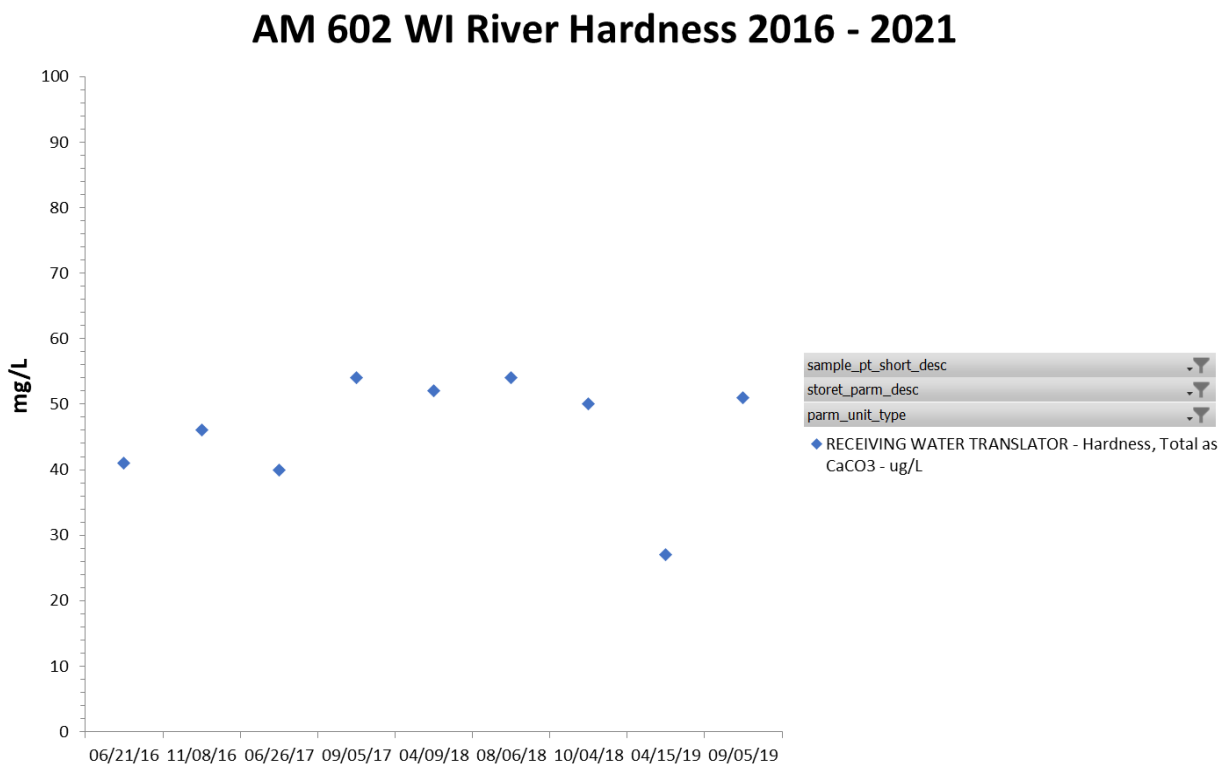

AM 008 Flow Rate 2016 - 2021
MGD
0.01
0.008
0.006
0.004
0.002
0
02/26/16
06/22/16
07/18/16
11/08/16
02/07/17
05/02/17
07/11/17
10/11/17
03/29/18
06/04/18
09/27/18
10/25/18
03/04/19
04/16/19
07/10/19
10/03/19
03/13/20
05/06/20
08/26/20
11/16/20
01/18/21
04/19/21
07/19/21
11/10/21
sample_pt_short_desc
storet_parm_desc
parm_unit_type
FILTER BACKWASH - Flow Rate


AM 008 TSS 2016 - 2021
mg/L
200
180
160
140
120
100
80
60
40
20
0
02/26/16
06/22/16
07/18/16
11/08/16
02/07/17
05/02/17
07/11/17
10/11/17
04/02/18
06/04/18
09/27/18
10/25/18
03/04/19
04/16/19
07/10/19
10/03/19
03/13/20
05/06/20
08/26/20
11/16/20
01/18/21
04/19/21
08/18/21
11/10/21
sample_pt_short_desc
storet_parm_desc
parm_unit_type
FILTER BACKWASH - Suspended Solids, Total - mg/L

Sampling Point 602:






AM 602 WI River Hardness 2016 - 2021
mg/L
100
90
80
70
60
50
40
30
20
10
0
06/21/16
11/08/16
06/26/17
09/05/17
04/09/18
08/06/18
10/04/18
04/15/19
09/05/19
sample_pt_short_desc
storet_parm_desc
parm_unit_type
RECEIVING WATER TRANSLATOR - Hardness, Total as CaCO3 - ug/L

APPENDIX B

TECHNOLOGY-BASED EFFLUENT LIMIT CALCULATIONS FOR BOD5 AND TSS

Derivation of Current Effluent Limits Based on Historic Production Trends

BOD5: 191 TPD Unbleached Kraft Pulp, 268 TPD Specialty Papers
TSS: 246.5 TPD Unbleached Kraft Pulp, 339.8 TPD Specialty Papers

The first set of figures are 1977 production rates. The second set include demonstrated production for the period from August 19, 1983 through August 18, 1984 plus committed growth of 25 TPD of pulp and 37.1 TPD of paper to have occurred following the completion of a woodworm/digester modernization project in October of 1986.

In its 1986 application for permit reissuance and again in its 1989 petition for administrative review, Mosinee Paper requested increased BOD5 and TSS effluent limitations to reflect increases in its pulp and paper production. In negotiations with the department, Mosinee Paper agreed to retain its BOD5 effluent limitations in exchange for increased TSS effluent limitations. Consistent with this agreement, the BOD5 effluent limits are based on 1977 production rates and TSS effluent limits are based on 1983-84 production and committed growth.

BPT Effluent Limits (from ch. NR 284, Wis. Adm. Code)

Subcategories	BOD5 (lbs/ton)		TSS (lbs/ton)	
	Monthly Avg	Daily Maximum	Monthly Avg	Daily Maximum
Unbleached Kraft	5.6	11.2	12.0	24.0
Nonintegrated Fine Papers	8.5	16.4	11.8	22.0

Limits were calculated by applying Mosinee Paper's entire paper production to the nonintegrated fine paper subcategory and applying pulp production to the integrated unbleached kraft subcategory. Typically, only paper production from purchased pulp, the difference between paper and pulp production, is applied to the nonintegrated subcategory. An atypical approach was supported by observations that recycling of wastewaters between pulp and paper mills was not possible and that frequent grade changes result in greater than normal water use. Thus, the pulp and paper mills were considered separate facilities when deriving technology-based effluent limits.

BOD5:

- (5.6 lbs BOD5/ton x 191 TPD) + (8.5 lbs BOD5/ton x 268 TPD) = 3,348 lbs BOD5/day monthly average
- (11.2 lbs BOD5/ton x 191 TPD) + (16.4 lbs BOD5/ton x 268 TPD) = 6,534 lbs BOD5/day daily maximum

TSS:

- (12.0 lbs TSS/ton x 246.5 TPD) + (11.8 lbs TSS/ton x 339.8 TPD) = 6,968 lbs TSS/day monthly average
- (24.0 lbs TSS/ton x 246.5 TPD) + (22.0 lbs TSS/ton x 339.8 TPD) = 13,392 lbs TSS/day daily maximum

Derivation of Effluent Limits Based on Current Production Trends

BPT Effluent Limits (from ch. NR 284, Wis. Adm. Code)

Subcategories	BOD5 (lbs/ton)		TSS (lbs/ton)	
	Monthly Avg	Daily Maximum	Monthly Avg	Daily Maximum
Unbleached Kraft	5.6	11.2	12.0	24.0
Nonintegrated Fine Papers	8.5	16.4	11.8	22.0

BOD5:

- (5.6 lbs BOD5/ton x 299 TPD) + (8.5 lbs BOD5/ton x 318 TPD) = 4,377 lbs BOD5/day monthly average
- (11.2 lbs BOD5/ton x 299 TPD) + (16.4 lbs BOD5/ton x 318 TPD) = 8,564 lbs BOD5/day daily maximum

TSS:

- (12.0 lbs TSS/ton x 299 TPD) + (11.8 lbs TSS/ton x 318 TPD) = 7,340 lbs TSS/day monthly average
- (24.0 lbs TSS/ton x 299 TPD) + (22.0 lbs TSS/ton x 318 TPD) = 14,172 lbs TSS/day daily maximum

The Mosinee Mill's current production rates exceed those used to derive technology-based effluent limits. While the Mill is entitled to effluent limits that are based on current rates of production, Wisconsin's water quality antidegradation and antibacksliding requirements in ch. NR 207, Wis. Adm. Code must be met before technology-based BOD_5 and TSS permit limits may be increased. Should AhlstromM request less restrictive technology-based effluent limits, the atypical method for calculating the limits should also be reconsidered.

APPENDIX C:

FULL BTA DETERMINATION: COOLING WATER INTAKE STRUCTURES

EXECUTIVE SUMMARY

In conformity with Section 316(b) of the Clean Water Act, the location, design, construction, and capacity of cooling water intake structures should reflect the best technology available (BTA) for minimizing adverse environmental impacts. The department has made a Best Technology Available (BTA) determination for a cooling water intake structure (CWIS) utilized by Ahlstrom Mosinee LLC (Ahlstrom) in accordance with ch. NR 111, Wis. Adm. Code. The BTA for the CWIS is based on the required information submitted for a facility that withdraws greater than 2 MGD Design Intake Flow (DIF) and uses at least 25% of the total water withdrawn for cooling purposes. Ahlstrom is considered an existing facility for purposes of the rule because construction of the facility commenced prior to January 17, 2002 (s. NR 111.02(3)(a), Wis. Adm. Code).

The department has concluded that existing impingement and entrainment reduction measures at Ahlstrom's intake do not meet the standards for best technologies available (BTA) for minimizing impingement mortality or for minimizing entrainment. Therefore, a compliance schedule is proposed in the draft permit in accordance with s. NR 111.11(3)(a), Wis. Adm. Code.

The department must establish BTA standards for entrainment reduction for the intake on a site-specific basis (s. NR 111.13, Wis. Adm. Code). "These standards shall reflect the department's determination of the maximum reduction in entrainment warranted after consideration of the relevant factors as specified in subs. (2) and (3)" (s. NR 111.13, Wis. Adm. Code). After consideration of the factors specified in ss. NR 111.13(2) and (3), Wis. Adm. Code, the department has concluded that the CWIS is not considered the best technology available to achieve the maximum reduction in entrainment.

The BTA determination will be reviewed at the next permit reissuance and at subsequent reissuances in accordance with ch. NR 111, Wis. Adm. Code, as applicable. In subsequent permit reissuance applications, the permittee shall provide all the information required in s. NR 111.40(2)(b), Wis. Adm. Code, unless a request to reduce the information required has been submitted by the permittee and accepted by the department, as allowed by s. NR 111.42(1)(a), Wis. Adm. Code.

BACKGROUND INFORMATION

Ahlstrom is situated on the eastern shore of the Wisconsin River in the town of Mosinee, Wisconsin by the Mosinee Flowage. The Mosinee Flowage is a man-made impoundment formed by the Mosinee Dam on the Wisconsin River created by the construction of the dam in 1909. The intake structure is part of the dam and is regulated as such through the Federal Energy Regulatory Commission (FERC). The maximum flow condition for design of the flash boards on the dam is described as 3-feet over the flash boards or elevation 1,041.5 ft. The design intake flow (DIF) for the CWIS is 31.3 million gallons per day (MGD).

INTAKE STRUCTURE DESCRIPTION

The coordinates for the CWIS are 44°47'27.1"N, 89°41'40.3"W. The in-plant cooling water portion of the overall flow from the intake structure is calculated to be less than 25 percent of the total water withdrawn. However, the discharge of the in-plant cooling water is comingled with the sump overflow prior to discharge to the Wisconsin River. The sump

overflow, which comprises approximately 96% of the total flow discharged through the outfall, is part of the cooling water system because it provides some cooling to the cooling water prior to discharge. For a map showing the approximate location of the intake structure, see Figure 1.

The intake structure is a lined concrete channel that draws from the full water column at the location. The channel has a concrete cap and directs water through a bar rack. The bar rack is manually cleaned. From the bar rack chamber the water flows into two concrete pipes (36” and 24” diameter) that then gravity flow to the screening building where the sump is located. These pipes are installed behind a masonry wall near the dam and are routed underground to the existing intake building. Along the pipe route are several access structures to allow clearing of debris or for inspections. The access structures are rectangular concrete vaults that extend up to an approximate elevation of 1,140 ft, which is higher than the flash boards on the dam. The 36” pipe was slip-lined several years ago with a flexible fabric lining system to aid in minimizing leakage and facilitating flow. The 24” pipe has not been relined and the permittee has indicated that it may be the source of significant seepage along the pipe route.

There currently are no controls on the piping system. There are stop-logs at the intake that will restrict total flow to the screening building, but no individual controls on either pipe. This limits Ahlstrom’s current ability to control flows and therefore results in excess water spilling over the overflow weir to the outfall channel.

The elevation of the Mosinee Flowage is 1,132 ft, with the screening building having an elevation of 1,128.6 ft. The pipe run from the intake structure to the screening building is 1,050 ft. Therefore, the head between the intake structure pipe and the screening building is assumed to be 1,132 ft minus 1,128.6 ft or 3.4 ft. Using the Hazen-Williams equation, the intake flowrate is calculated to be 22.7 MGD in the 36” pipe, and 8.6 MGD in the 24” pipe. For this evaluation the design intake flow is assumed to be 31.3 MGD.

Traveling screens are in the screening building and have wire spacing of approximately 3/8- inch with an opening of slightly less than 3/16”. The screens process water from the sump to the Up-flow Clarifier or to raw water pumps for use as process and cooling water at Ahlstrom.

Figure 1 - Map of Intake Location

APPLICATION MATERIALS SUBMITTED

As part of the WPDES Permit Application, Ahlstrom was required to submit information required under s. NR 111.41(1) through (12). Ahlstrom provided the information required under s. NR 111.41(1) through (12). The relevant application materials were included in a report titled "*Clean Water Act 316(b) Compliance Submittal Requirements per 40 CFR 122.21(r)(2) through (8)*", dated May 2019, and produced by Environmental Consulting and Technology, Inc (ECT).

In accordance with s. NR 111.11(1)(a), Ahlstrom is subject to the best technology available (BTA) standards for impingement mortality reduction under s. NR 111.12 and entrainment mortality reduction under s. NR 111.13, including any measures to protect federally-listed threatened and endangered species and designated critical habitat established under s. NR 111.14(7). A discussion on the BTA standards for impingement mortality is provided first followed by entrainment.

BTA STANDARDS FOR IMPINGEMENT MORTALITY

In accordance with s. NR 111.12(1)(a), Ahlstrom must comply with one of the alternatives in sub. 1. through 7. except as provided in sub. (b)1. or 2., when approved by the department. In addition, a facility may also be subject to the requirements of s. NR 111.12(2), Wis. Adm. Code, if the department requires such additional measures.

IM OPTION 1: CLOSED CYCLE RECIRCULATING SYSTEM

Ahlstrom is considering this option for the purposes of fulfilling the entrainment standard; however, this is heavily dependent on the feasibility of implementing other potential options.

IM OPTION 2: 0.5 FEET PER SECOND MAXIMUM DESIGN INTAKE VELOCITY

One option for compliance with the impingement mortality BTA standard is achieving 0.5 Feet per second maximum design intake velocity (s. NR 111.12(1)(a)2., Wis. Adm. Code). As the basis for the department's determination, the owner or operator of the facility shall demonstrate that the cooling water intake structure has a maximum design intake velocity less than or equal to 0.5 feet per second under all conditions. The owner or operator of the facility shall submit information to the department that demonstrates that the maximum design intake velocity does not exceed 0.5 feet per second.

S. NR 111.03(26), Wis. Adm. Code defines 'Maximum design intake velocity' as:

"*The value assigned during the cooling water intake structure design to the maximum instantaneous speed at which the cooling system is capable of withdrawing water through the intake screen or inlet from a source waterbody, applied at all points between the point at which water is withdrawn from a water of the state and the first screen or other structure that has a mesh with a maximum distance in the openings of 0.56 inches, and calculated using the following equation: V = Q /(A * P) where*

V = the maximum design intake velocity,
Q = the maximum volumetric flow rate based on pump capacities, excluding emergency and redundant pumps.
A = typical wetted area of the screen at $Q_{7,10}$ *flows.*
P = screen open area percentage divided by 100.

For a facility that uses other intake designs that do not use a screen, the maximum design intake velocity shall be determined using an alternate method approved by the department."

Intake Velocity Calculation

The predicted maximum design intake velocity throughout the intake structure is shown below:

Bar Rack: $$V_{BR} = \frac{Q}{A*P} = \frac{31{,}300{,}000\frac{gal}{day}*\frac{1\,ft^3}{7.48\,gal}*\frac{1\,day}{86{,}400\,sec}}{13\,ft*9.14\,ft*0.72} = 0.57\,ft/s$$

36" Pipe: $$V_{36"} = \frac{Q}{A*P} = \frac{22{,}700{,}000\frac{gal}{day}*\frac{1\,ft^3}{7.48\,gal}*\frac{1\,day}{86{,}400\,sec}}{\pi*\left(\frac{18\,inches}{12\frac{inches}{ft}}\right)^2*1} = 4.97\,ft/s$$

24" Pipe: $V_{24"} = \frac{Q}{A*P} = \frac{8{,}600{,}000\frac{gal}{day}*\frac{1\ ft^3}{7.48\ gal}*\frac{1\ day}{86{,}400\ sec}}{\pi*\left(\frac{12\ inches}{12\frac{inches}{ft}}\right)^2*1} = 4.24\ ft/s$

Screen House: $V_{SH} = \frac{Q}{A*P} = \frac{31{,}300{,}000\frac{gal}{day}*\frac{1\ ft^3}{7.48\ gal}*\frac{1\ day}{86{,}400\ sec}}{2\ screens*10.5\ ft*5.67\ ft*0.83} = 0.49\ ft/s$

While the intake has a DIF <0.5 ft/s when calculated at the traveling screens, it does not have an intake velocity which would allow for potentially impingeable fish to escape within the 36" and 24" concrete pipes. The current design likely results in fish becoming entrapped within the intake structure. Based on the available information, the intake does not currently meet this impingement mortality standard.

IM Option 3: 0.5 Feet per second actual intake velocity

This option is not available to Ahlstrom under the status quo as a flow limitation is currently not feasible with the existing setup of the intake structure. This option may be explored if modifications to control the flow within the intake structure are made during the permit term.

IM Option 4: Existing offshore velocity cap

This option is not available to Ahlstrom as they do not operate an existing offshore velocity cap that was installed on or before October 14, 2014.

IM Option 5: Modified traveling screens

Ahlstrom has initially rejected this option in favor of other compliance options.

IM Option 6: Systems of technologies as the BTA for impingement mortality

Ahlstrom has initially rejected this option in favor of other compliance options.

IM Option 7: Impingement mortality performance standard

Ahlstrom has initially rejected this option in favor of other compliance options.

Impingement Mortality BTA Decision

Ahlstrom has identified the following compliance methods to comply with the impingement mortality standard, which they anticipate evaluating during the upcoming permit term:

1. Install a new intake structure upstream of the current location that meets one of the requirements of the rule.
2. Separate sump overflow from Outfall 005 to reduce the amount of water used from the intake structure for the purpose of cooling water.
3. Make reductions in water usage and install controls to reduce the overflow from the water sump.
4. Control the sump overflow to reduce the amount of water that overflows the water sump, thus keeping below the 25% cooling water threshold.

Options 2, 3, and 4 will all potentially reduce the cooling water usage to below 25%, which would result in Ahlstrom not being subject to a full BTA determination as required under ch. NR 111, Wis. Adm. Code. However, if one of those

options are implemented, the permittee will still be subject to a BTA determination based on the department's best professional judgement (BPJ), as required by s. 316(b) of the Clean Water Act:

"*COOLING WATER INTAKE STRUCTURES—Any standard established pursuant to section 1311 of this title or section 1316 of this title and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact."*

The department issued BPJ BTA determination guidance in 2020 which outlines considerations that should be made by staff when making these evaluations. Though this guidance is typically not relevant for full BTA determinations under NR 111, this specific situation warrants a preliminary acknowledgment in anticipation of potential changes made during this next permit term.

The guidance outlines the following general guidelines that staff may use when making BPJ BTA determinations for impingement (which mirror impingement BTA standards in s. NR 111.12, Wis. Adm. Code):

a) Each water intake structure has a maximum design intake velocity of 0.5 feet per second (fps) 1 OR a maximum actual intake velocity of 0.5 fps, demonstrated via measured or calculated values which show the maximum intake velocity as water passes through the intake system, measured perpendicular to the opening, does not exceed 0.5 fps at any point up until the first screen of mesh size 3/8" (or equivalent) or less.
b) The facility operates a closed-cycle recirculating system that only requires make-up water with > 3 cycles of concentration on at least a daily basis. Cycles of concentration can be measured as the ratio of chloride levels in the recirculated water or blowdown relative to the chloride levels in the source water, or makeup water; or the make-up water volume divided by the blowdown volume (provided there aren't other water losses); or the blowdown water conductivity divided by the make-up water conductivity.
c) The facility operates an intake structure that minimizes impingement rates by nature of its location (e.g. offshore velocity cap).
d) The facility employs a system of technologies (e.g. wedge-wire screens, barrier nets; acoustic, light, or pH deterrent systems; variable speed pumps, etc.) that minimize impingement mortality rates.
e) The facility operates a modified traveling screen in an optimal manner that does not promote re-impingement or predation of returned organisms.
f) The facility's intake withdraws water at > 0.25 fps less than or equal to 16% of the time.
g) There is data indicating that the impingement mortality rate has been/will be reduced 80-95% compared to a once-through cooling system with 3/8" traveling screens.
h) There is biological data that affirmatively demonstrates that: 1) the source water body does not include threatened or endangered species in the vicinity of the intake, and 2) there are no aquatic life and water quality problems partly or solely due to the presence or operation of the intake structure.

If Ahlstrom were to modify their operations/the intake structure itself to utilize <25% of the water for cooling purposes and thus not subject to NR 111 for the next WPDES permit reissuance, they would still be subject to a BPJ BTA determination. Based on the velocity calculations in s. 5 above, the facility would not fulfill the velocity guideline, as fish could still be entrapped prior to reaching the 3/8" traveling screens. The department recommends that the permittee takes these general guidelines into consideration when making upgrades to the intake structure system.

BTA STANDARDS FOR ENTRAINMENT

The permittee proposes that the design and operation of the intake meets the BTA standards for entrainment mortality reduction. The department has evaluated this proposal under s. NR 111.13 and recommends the approval of this proposal. Below is a written explanation of the proposed entrainment determination as required by s. NR 111.13(1).

For entrainment control, the regulations expressly call for the permitting agency to make a site-specific determination of which technologies and/or practices satisfy the BTA standard for each individual facility (s. NR 111.13, Wis. Adm. Code). The BTA "shall reflect the department's determination of the maximum reduction in entrainment warranted after consideration of the relevant factors as specified in subs. (2) and (3)." The regulations also give the department the discretion to reject an otherwise available technology as the BTA for entrainment if the social costs are not justified by the social benefits or if there are other unacceptable adverse factors that cannot be mitigated (s. NR 111.13(4)).

The proposed determination must be based on consideration of any additional information required by the department and the factors listed in s. NR 111.13(2)(a). The weight given to each factor is within the department's discretion based upon the circumstances of each facility. In addition, the proposed determination may be based on consideration of the factors listed in s. NR 111.13(3).

In accordance with s. NR 111.13(2), the following factors must be considered:

1. Numbers and types of organisms entrained, including, specifically, the numbers and species (or lowest taxonomic classification possible) of Federally-listed, threatened and endangered species, and designated critical habitat (e.g., prey base);
2. Impact of changes in particulate emissions or other pollutants associated with entrainment technologies;
3. Land availability inasmuch as it relates to the feasibility of entrainment technology;
4. Remaining useful plant life; and
5. Quantified and qualitative social benefits and costs of available entrainment technologies when such information on both benefits and costs is of sufficient rigor to make a decision.

In accordance with s. NR 111.13(3), the following factors may be considered in determining a site-specific BTA:

1. Entrainment impacts on the waterbody;
2. Thermal discharge impacts;
3. Credit for reductions in flow associated with the retirement of units occurring within the ten years preceding October 14, 2014;
4. Impacts on the reliability of energy delivery within the immediate area;
5. Impacts on water consumption; and
6. Availability of process water, gray water, wastewater, reclaimed water, or other waters of appropriate quantity and quality for reuse as cooling water.

In the preamble to the 316(b) Rule (79 Fed. Reg. 48300 at 48303), USEPA indicated the following:

> *The entrainment provision reflects EPA's assessment that there is no single technology basis that is BTA for entrainment at existing facilities, but instead a number of factors that are best accounted for on a site-specific basis. Site-specific decision making may lead to a determination by the NPDES permitting authority that*

entrainment requirements should be based on variable speed pumps, water reuse, fine mesh screens, a closed-cycle recirculating system, or some combination of technologies that constitutes BTA for the individual site. The site-specific decision-making may also lead to no additional technologies being required.

Candidate entrainment control technologies are provided in s. NR 111.41(13), including a closed cycle recirculation system, fine mesh screens with a mesh size of 2 mm or smaller, and water reuse or alternate sources of cooling water, and variable speed pumps (i.e., variable frequency drive pumps).

ENTRAINMENT PERFORMANCE EVALUATION

ENTRAINMENT CHARACTERIZATION DATA

Ahlstrom has not collected site-specific entrainment data, so the department has reviewed intake data collected by Wisconsin Public Service Corp's Weston generating station ('Weston,' Permit No. WI-0042765-08-0) to estimate likely entrainment impacts from Ahlstrom's intake. Weston's intake is approximately 30,000 feet upstream of Ahlstrom's intake. This data was collected over a period of 6 months from April 14 to September 29, 2021. A summary of this data can be found below in Tables 1 and 2.

Table 1: Entrainment Density Estimates based on Weston Entrainment Characterization Study

	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
Total Density from 2021 Weston Entrainment Characterization Study (No./100 m^3)	0.62	0.74	1.99	1.60	0.06	0	-
Number of Entrainable Organisms in Area of Intake (based on 674 MGD, the $Q_{7,10}$ of Wisconsin River)	15,818	18,880	50,772	40,822	1,531	0	127,824
Estimated Number of Entrained Organisms at Ahlstrom Intake (based on DIF of 31.3 MGD)	735	877	2,358	1,896	71	0	5,936

Table 2: Relative Percent Composition of Entrained Organisms at Weston Intake April - September 2021

Common Name	Scientific Name	Relative Percent Composition
Yellow bullhead	*Ameiurus natalis*	33%
Yellow perch	*Perca flavescens*	22%
Bullheads	*Ameiurus sp.*	22%
Rainbow darter	*Etheostoma caeruleum*	11%
Sunfish/Bluegill	*Lepomis sp.*	11%

There are some important caveats to note about this dataset from Weston. This data was collected within Weston's intake for their Units 3 and 4. This intake is located approximately 30 feet from the shoreline, whereas Ahlstrom's intake is located on the shoreline. This discrepancy is important as the entrainment data collected at Weston may be an underestimate of the actual density of entrainable organisms in the vicinity of Ahlstrom's intake. Furthermore, this extrapolation assumes that there is a relatively even distribution of entrainable organisms within the Wisconsin River. This is not necessarily true, as there is likely a higher density of entrainable organisms closer to the shoreline.

In the absence of site-specific entrainment data, the Weston data can be used to provide a lower estimate the potential impacts from Ahlstrom's intake and the fish species which are most likely affected, but it should not be construed to be representative of the entrainable organism density within the vicinity of Ahlstrom's intake. Due to the limits associated with the Weston dataset, the department is focusing on the percentage of the Wisconsin River flow withdrawn by Ahlstrom's intake rather than the density estimates themselves.

31.3 MGD represents the maximum design flow through Ahlstrom's intake (4.6% of $Q_{7,10}$ of Wisconsin River). Therefore, the department anticipates that a maximum of 4.6% of entrainable organisms in the vicinity of Ahlstrom's intake would be entrained during operation.

Current Entrainment Control Measures

The primary argument that entrainment is minimized at Ahlstrom is that the withdrawal constitutes a relatively small percentage of the mean annual river flow (4.6%). Also, most of the flow is routed through the sump overflow and subsequently discharged through Outfall 005, although these organisms are exposed to elevated temperature when the sump overflow is commingled with the mill's NCCW discharge.

Evaluation of Other Candidate Entrainment Control Technologies

The department assumes 100% mortality for entrained organisms. If the permittee were to separate the sump overflow from commingling with the NCCW stream, or otherwise modify the intake structure to reduce the amount of flow from the river, the department estimates that this would reduce current entrainment rates by over 40%[1].

Below is the department's evaluation of the candidate entrainment technologies:

1 TECHNOLOGY: Mechanical Draft Cooling Towers (closed-cycle recirculating system)

1.1. FACTOR s. NR 111.13(2)(a)1., Wis. Adm. Code: Numbers and types of organisms entrained, including, specifically, the numbers and species (or lowest taxonomic classification possible) of Federally-listed, threatened and endangered species and designated critical habitat (e.g., prey base).

A closed cycle recirculating system (CCRS) would potentially reduce entrainment. This is because entrainment reductions are directly proportional to flow reductions. As discussed in the 316(b) Rule Preamble, mechanical draft cooling towers operating in freshwater sources can achieve flow reductions of 97.5 percent (based on a cycle of concentration of 3.0). 79 Fed. Reg. 48300 at 48338. Therefore, USEPA estimates that freshwater cooling towers, compared to once-through cooling systems, reduce impingement mortality and entrainment by 97.5 percent.[2] However, since process wastewater comprises the majority of the flow outside of the sump overflow, these reductions are anticipated to be less at Ahlstrom.

[1] This number is derived from the design flow rate (31.3 MGD) compared to the average amount of sump overflow water (14.4 MGD)
[2] USEPA. Technical Development Document for the Final Section 316(b) Existing Facilities Rule. EPA-821-R-14-002. May 2014.

Mechanical draft cooling towers (MDCT) are large facilities often associated with power generating stations. These structures use large flows of water through the towers along with a mechanical fan to create differential pressure between the tower interior and exterior, inducing a draft through the tower, and exhausting at the top the tower as a warm vapor plume. These systems require a large footprint, a significant amount of energy, and a large cooling water flow to operate. MDCTs can be in a rectilinear arrangement or in a circular arrangement. MDCTs can achieve the heat loss for Ahlstrom and can be considered a potential technology to decrease entrainment.

1.2. FACTOR s. NR 111.13(2)(a)2., Wis. Adm. Code: Impact of changes in particulate emissions or other pollutants associated with entrainment technologies.

Installation of mechanical draft cooling towers would result in increased air emissions, and a new emission source. While any tower would likely utilize plume abatement technology, the towers would produce visibility reduction due to fogging, ice formation on surfaces downwind from the cells, and visual pollution as perceived by receptors adjacent to Ahlstrom.

It is expected that the parasitic load created by the addition of the tower fans and pump station would cause an energy penalty that would be replaced by a nearby fossil fuel burning facility, which would lead to an increase in gas combustion emissions.

Energy would also need be replaced by nearby fossil fuel burning facilities during the process of retrofitting Ahlstrom for a CCRS.

1.3. FACTOR s. NR 111.13(2)(a)3., Wis. Adm. Code: Land availability inasmuch as it relates to the feasibility of entrainment technology.

The availability of space for infrastructure was considered in the assessment of entrainment BTA. There is potentially enough space onsite for a MDCT. However, since the permittee has not evaluated this entrainment technology, the department is unable to definitively rule out this technology based on this factor.

1.4. FACTOR s. NR 111.13(2)(a)4., Wis. Adm. Code: Remaining useful plant life.

This BTA determination assumes that Ahlstrom will have several years of operational viability.

1.5. FACTOR s. NR 111.13(2)(a)5., Wis. Adm. Code: Quantified and qualitative social benefits and costs of available entrainment technologies when such information on both benefits and costs is of sufficient rigor to make a decision.

The permittee has not quantified costs associated with retrofitting their facility for a CCRS, so the department cannot rule out this technology based on this factor.

1.6. FACTOR s. NR 111.13(3)(a), Wis. Adm. Code: Entrainment impacts on the waterbody.

Reductions in entrainment are unknown since the facility has not fully evaluated this technology, but a 97% reduction in entrainment would potentially have a beneficial impact on the local biological community.

1.7. FACTOR s. NR 111.13(3)(b), Wis. Adm. Code: Thermal discharge impacts.

Cooling towers would decrease thermal impacts in limited areas around outfalls, but have little effect on river overall based on the thermal discharge relative to river flow.

1.8. Summary/Conclusion

Mechanical Draft Cooling Towers would potentially reduce entrainment due to decreased flows, and as of the date of this BTA determination, have not been ruled out by the facility. Knowing this, the department has determined that a CCRS

would potentially meet the BTA requirement for minimizing entrainment mortality. The permittee will have a compliance schedule in the permit to fully evaluate this technology.

2 TECHNOLOGY: FINE MESH SCREENS

2.1. FACTOR s. NR 111.13(2)(a)1., Wis. Adm. Code: Numbers and types of organisms entrained, including, specifically, the numbers and species (or lowest taxonomic classification possible) of Federally-listed, threatened and endangered species and designated critical habitat (e.g., prey base).

Fine mesh screens would potentially reduce entrainment by physically preventing the passage of eggs and larvae further into the plant. This is because the openings in a fine mesh screen are smaller than many fish eggs and larvae. Entrainment reduction percentages through the use of fine mesh screens vary widely from facility to facility. Additionally, eggs and larvae could potentially end up being impinged on the mesh screens and die anyway.

2.2. FACTOR s. NR 111.13(2)(a)2., Wis. Adm. Code: Impact of changes in particulate emissions or other pollutants associated with entrainment technologies.

Installation of fine mesh screens are not anticipated to have an effect on the particulate emissions from Ahlstrom.

2.3. FACTOR s. NR 111.13(2)(a)3., Wis. Adm. Code: Land availability inasmuch as it relates to the feasibility of entrainment technology.

Land availability is not typically a concern for the use of fine mesh screens since they are installed in the source waterbody.

2.4. FACTOR s. NR 111.13(2)(a)4., Wis. Adm. Code: Remaining useful plant life.

This BTA determination assumes that Ahlstrom will have several years of operational viability.

2.5. FACTOR s. NR 111.13(2)(a)5., Wis. Adm. Code: Quantified and qualitative social benefits and costs of available entrainment technologies when such information on both benefits and costs is of sufficient rigor to make a decision.

Installation of new fine mesh screen systems would require retrofitting the intake. Operation of FMS would also result in increased clogging. Quantified and qualitative social benefits and costs are not of sufficient rigor to make a decision based on this factor.

2.6. Summary/Conclusion

Fine mesh screens would potentially reduce entrainment by physical exclusion of anything larger than the slot size of the mesh. However, the department is rejecting this technology as BTA since this would presumably result in an increase of impingement mortality based on eggs and larvae becoming impinged on the FMS.

3 TECHNOLOGY: ALTERNATIVE SOURCES OF COOLING WATER AND WATER REUSE

3.1. FACTOR s. NR 111.13(2)(a)1., Wis. Adm. Code: Numbers and types of organisms entrained, including, specifically, the numbers and species (or lowest taxonomic classification possible) of Federally-listed, threatened and endangered species and designated critical habitat (e.g., prey base).

Alternative sources of cooling water and water reuse may potentially reduce entrainment by reducing the intake flow from the source water. This is because reductions in entrainment are directly proportional to flow reductions. The entrainment reductions from an alternative source of cooling water vary based on how much of the cooling water required by the facility can be provided through an alternative source.

3.2. FACTOR s. NR 111.13(2)(a)2., Wis. Adm. Code: Impact of changes in particulate emissions or other pollutants associated with entrainment technologies.

The department does not anticipate that particulate emissions would be affected by utilizing an alternative source for NCCW or process wastewater. However, the permittee has not fully evaluated water reuse within the facility.

3.3. FACTOR s. NR 111.13(2)(a)3., Wis. Adm. Code: Land availability inasmuch as it relates to the feasibility of entrainment technology.

Many of the systems served by Ahlstrom's intake are inside existing mill buildings, which would require that Ahlstrom convey water to the site through the construction of new pipelines.

3.4. FACTOR s. NR 111.13(2)(a)4., Wis. Adm. Code: Remaining useful plant life.

This BTA determination assumes that the Ahlstrom will have several years of operational viability.

3.5. FACTOR s. NR 111.13(2)(a)5., Wis. Adm. Code: Quantified and qualitative social benefits and costs of available entrainment technologies when such information on both benefits and costs is of sufficient rigor to make a decision.

No nearby water source is available for Ahlstrom to utilize. Nearest POTW (gray water) or potable water sources do not have sufficient capacity to supply the mill. If the intake structure is not abandoned in its entirety or significantly modified, the intake will withdraw the same flow rate even after introduction of gray water. This is because the amount of surface water currently used in the plant that is replaced by water re-use would just become sump overflow, which is still water withdrawn. Therefore, unless there is a source available that would supply all of Ahlstrom's needs, this is not a feasible option. These factors could change if Ahlstrom were to adjust the sump overflow discharge.

3.6. Summary/Conclusion

Utilizing alternative sources of cooling water may reduce entrainment due to the reduction in the required intake flow. However, reuse of POTW effluent is not ideal given the constraints associated with existing operations. The department has thus rejected alternative sources of cooling water as BTA for Ahlstrom primarily due to the significant difference anticipated between social costs and benefits. With that said, the reuse of cooling water as process wastewater within the mill has not been fully evaluated by the facility and thus cannot be rejected by the department.

4 TECHNOLOGY: VARIABLE SPEED PUMPS

4.1. FACTOR s. NR 111.13(2)(a)1., Wis. Adm. Code: Numbers and types of organisms entrained, including, specifically, the numbers and species (or lowest taxonomic classification possible) of Federally-listed, threatened and endangered species and designated critical habitat (e.g., prey base).

Variable speed pumps would potentially reduce entrainment by reducing flow when less than the full flow that the pump is able to provide is needed. The reduction in entrainment provided by VSPs is dependent on when flow reductions occur in relation to the productive periods of the source waterbody. Flow reductions based on installation of VSPs is anticipated to be minimal, as the current intake system is gravity-fed and dependent on the flow of the river. If VSPs were installed within the existing setup of the intake, the entrainment rates are not anticipated to be reduced.

4.2. FACTOR s. NR 111.13(2)(a)2., Wis. Adm. Code: Impact of changes in particulate emissions or other pollutants associated with entrainment technologies.

It is unlikely that the installation or use of VSPs would lead to significant changes in the emission of particulates or other pollutants.

4.3. FACTOR s. NR 111.13(2)(a)3., Wis. Adm. Code: Land availability inasmuch as it relates to the feasibility of entrainment technology.

Land availability should not be a concern in the implementation of VSPs since they can be installed in place of an existing pump.

4.4. FACTOR s. NR 111.13(2)(a)4., Wis. Adm. Code: Remaining useful plant life.

This BTA determination assumes that the Ahlstrom will have several years of operational viability.

4.5. FACTOR s. NR 111.13(2)(a)5., Wis. Adm. Code: Quantified and qualitative social benefits and costs of available entrainment technologies when such information on both benefits and costs is of sufficient rigor to make a decision.

A quantified and qualitative analysis of social costs and benefits was not done for this technology. VSPs are however relatively inexpensive when compared to other options, so it can be estimated that the social costs of this technology will not significantly outweigh the social benefits provided by the use of this technology.

4.6. Summary/Conclusion

Entrainment reductions are directly proportional to flow reductions. However, anticipated flow reductions which could be attributed to VSPs are likely minimal, given that water flows through the intake by gravity before pumps are even utilized. The department has concluded that due to the factors listed in NR 111.13, Wis. Adm. Code, the use of one or more VSPs is not BTA for Ahlstrom.

5 TECHNOLOGY: SUMP OVERFLOW SEPARATION

5.1. FACTOR s. NR 111.13(2)(a)1., Wis. Adm. Code: Numbers and types of organisms entrained, including, specifically, the numbers and species (or lowest taxonomic classification possible) of Federally-listed, threatened and endangered species and designated critical habitat (e.g., prey base).

Under the status quo, sump overflow commingles with NCCW and is subsequently discharged through Outfall 005. If the permittee were to separate the sump overflow from the NCCW outfall, this would potentially reduce entrainment by 40% or more. This is because the department assumes 100% mortality for entrained organisms, and the process of the sump overflow commingling with the NCCW outfall is presumed to harm these organisms. By separating the sump overflow from the NCCW line, this would not only result less entrainment, but it would also potentially reduce the amount of water used exclusively for cooling purposes to below 25%.

5.2. FACTOR s. NR 111.13(2)(a)2., Wis. Adm. Code: Impact of changes in particulate emissions or other pollutants associated with entrainment technologies.

Separation of the sump overflow from the NCCW outfall is anticipated to have a minimal impact on long-term emission of particulates. However, with the lack of river water dilution subsequently available at Outfall 005, the discharge's average maximum daily temperature would presumably increase.

5.3. FACTOR s. NR 111.13(2)(a)3., Wis. Adm. Code: Land availability inasmuch as it relates to the feasibility of entrainment technology.

This is not anticipated to be a restrictive factor for this technology.

5.4. FACTOR s. NR 111.13(2)(a)4., Wis. Adm. Code: Remaining useful plant life.

This BTA determination assumes that Ahlstrom will have several years of operational viability.

5.5. FACTOR s. NR 111.13(2)(a)5., Wis. Adm. Code: Quantified and qualitative social benefits and costs of available entrainment technologies when such information on both benefits and costs is of sufficient rigor to make a decision.

The permittee has not quantified costs associated with separating the sump overflow from the NCCW outfall, so the department cannot definitively disregard this option based on this factor.

5.6. FACTOR s. NR 111.13(3)(a), Wis. Adm. Code: Entrainment impacts on the waterbody.

Reductions in entrainment are unknown since the facility has not fully evaluated this technology, but a 40%+ reduction in entrainment would have less of an impact on the Wisconsin River than the status quo.

5.7. FACTOR s. NR 111.13(3)(b), Wis. Adm. Code: Thermal discharge impacts.

Daily maximum temperatures from Outfall 005 would presumably increase as a result of the elimination of the dilution that the sump overflow provides. However, a review of temperature data from this outfall prior to commingling shows that exceedances are minimized. Also, the heat load impact on the river is anticipated to remain the same based on the mixing zone studies submitted during the permit term.

5.8. Summary/Conclusion

This technology is being evaluated at this time as it's possible that the permittee implements it during this permit term to comply with 316(b) requirements for intake structures. If the permittee separates the sump overflow from Outfall 005, the department anticipates that this would result in the permittee utilizing less than 25% of the water withdrawn exclusively for cooling purposes, and this technology would meet BTA for minimizing entrainment as part of the BTA determination based on the department's best professional judgment.

ENTRAINMENT BTA DECISION

In determining the entrainment BTA for Ahlstrom, alternative sources of cooling water, water reuse, fine mesh screens, closed-cycle recirculating systems, VSPs, and separating the sump overflow from Outfall 005 were evaluated. From these evaluations it was determined that the existing usage of the intake structure, based on the lack of current controls, is not considered BTA to achieve the maximum reduction in entrainment at Ahlstrom based on the factors specified in s. NR 111.13, Wis. Adm. Code. However, the department has determined that the elimination of the sump overflow or the installation of CCRS would be BTA for minimizing entrainment mortality. The permittee is required to evaluate these and the other alternatives during the next permit term, and make modifications to the facility as necessary to come into compliance with the requirements of ch. NR 111, Wis. Adm. Code.

SUMMARY

1. The department has made a Best Technology Available (BTA) determination for one cooling water intake structure, located at the Ahlstrom Mosinee facility (Ahlstrom) in accordance with ch. NR 111, Wis. Adm. Code. The department has concluded that this intake structure does not meet BTA for minimizing impingement mortality.
2. The permittee proposes to comply with a BTA impingement mortality standard in s. NR 111.12, Wis. Adm. Code. Therefore, a compliance schedule will go into the reissued permit allowing the permittee time to meet a BTA standard for impingement their one intake structure.

3. After consideration of the factors listed in s. NR 111.13, Wis. Adm. Code, the department has concluded that the existing CWIS is not considered the best technology available to achieve the maximum reduction in entrainment.
4. BTA determinations will be reviewed at the next reissuance and at subsequent reissuances in accordance with ch. NR 111, Wis. Adm. Code. In subsequent permit reissuance applications, the permittee shall provide all the information required in s. NR 111.4(2)(b), Wis. Adm. Code unless a request to reduce the information required has been submitted by the permittee and accepted by the department, as allowed by s. NR 111.42(1)(a).
5. The permit includes requirements for inspection of the CWIS and other requirements and terms; please see the permit for those requirements.

APPENDIX D:

TEMPORARY BOD5 WASTELOAD REALLOCATION

This fact sheet attachment provides a summary of steps taken to fulfill the temporary wasteload allocation transfer procedures under ch. NR 212 Wis. Adm. Code and Water Quality Antidegradation procedures under ch. NR 207, Wis. Adm. Code.

Transfer Procedures:

On February 25, 2013, Ahlstrom submitted its request for a reallocation of BOD5 wasteload allocation (WLA) under ch. NR 212 Wis. Adm. Code. Pursuant ch. NR 212.60 (4) Wis. Adm. Code, WLAs for BOD5 may be reallocated when a previously issued wasteload allocated permit is terminated to provide for new dischargers, increased production, or relief when a facility cannot consistently meet their current WLA requirements.

When Wausau Paper ceased operation of the Brokaw Mill (WPDES No. WI-0003379-07-0), it sold certain assets to a third party, but retained the WPDES permit and the associated WLA. The department terminated WPDES Permit No. WI-0003379-07-0 on June 6, 2013. Upon termination of the permit, BOD5 WLA became available for reallocation (available BOD5 WLAs). This provided an available wasteload for transfer to Ahlstrom pursuant the procedures in ch. NR 212.60 (4) (c). These procedures require a department notice of WLA availability, a 6-month inquiry period, and a public hearing prior to final department decision.

On August 28, 2022, the department issued a public notice of the availability of the Brokaw Mill's WLA because of Ahlstrom's allocation from the Brokaw Mill becoming available after the five-year temporary reallocation period. During the 6-month comment period, only Ahlstrom expressed interest in the available WLA. On May 25, 2023, a public meeting was held on the availability of the Brokaw Mill's WLA. The department did not receive any public comments or other requests for this WLA from any individuals or entities during the 6-month comment period, at the public meeting, or the seven days following the public meeting.

On January 13, 2023, the department received Ahlstrom's demonstration of need for additional WLA to fulfill the requirement of ch. NR 212.60 (4) (a), Wis. Adm. Code. The demonstration focused on two core motives for the transfer to of WLA from the Brokaw Mill to Ahlstrom. First, the mill has experienced episodic exceedances of the current WLA limitations. When investigating the cause of previous exceedances, Ahlstrom determined that although all treatment facilities were functioning as designed, low river flows and high river temperatures resulted in extremely stringent BOD5 limitations in the range of 1521-1784 pounds per day. For comparison, the current categorical limit for Ahlstrom is 6,534 pounds per day.

The second need for increased WLA is to accommodate production needs in the specialty paper segment. During the WLA season, Ahlstrom used to postpone production or adjust production schedules to avoid effluent limit exceedances. The increased WLA will allow Ahlstrom greater production flexibility to meet its customers' needs.

The Department will issue its Notice of Decision to Relocate BOD5 Wasteload in conjunction with the public comment period for this WPDES permit reissuance. Based on information from the WPDES file, comments received on the proposed reallocation, Ahlstrom's demonstration of need, and applicable Wis. Adm. Code, the Department concludes that ninety percent of the BOD5 WLAs made available with the termination of the Brokaw facility's WPDES [permit] shall be allocated to Ahlstrom with the remaining ten percent held as reserve capacity. The Department's decision on reallocation is unchanged from the original reallocation from the 2015 reissuance.

The remaining requirements to complete the BOD5 WLA reallocation are found under ch. NR 212.11 Wis. Adm. Code. Temporary reallocations may occur if: 1) Reallocations approved are for at least one calendar year and expire at the end of the affected discharger's WPDES permit term; 2) Reallocations account for differences in waste characteristics and location of discharge; 3) Reallocations do not result in the adjustment of the total maximum daily load; 4) The reallocation will not result in increased toxicity; and 5) the requirement that the reallocation expires at the end of the permit term must be included in the WPDES permit.

To fulfill the second requirement, HDR (on behalf of Expera) submitted a report on a modeling effort to study the effects of moving 90% of Brokaw's WLAs to Ahlstrom on January 13, 2016. The report estimates that under low flow conditions, the reallocation of BOD5 WLA would only result in a reduction of dissolved oxygen (DO) of 0.18mg/L in Lake Du Bay. The department has evaluated this report and concluded its information is still representative of low-flow conditions.

When evaluating this reduction DO concentration according to the Water Quality Antidegradation Guidelines in ch. NR 207, Wis. Adm. Code (explained in more detail below), it was determined that the reallocation would not result in a significant lowering of water quality. Requirement number three is met since the reallocation will not affect the total maximum daily load, but rather redistribute allocations within the same river reach. Requirement number 4 is met through Ahlstrom's Whole Effluent Toxicity (WET) test record. Continued frequent WET testing is required in the proposed WPDES permit to ensure this condition is met.

Requirements 1 and 5 are met by section 3.2.1.11.1 of the proposed permit. The reallocated BOD5 WLA will expire on March 31, 2029. Should Ahlstrom desire to retain the reallocation for future permit terms, the procedures in ch. NR 212.60 (4) Wis. Adm. Code must again be satisfied. This future demonstration could focus on any changes in the Wisconsin River which have occurred since the reallocation and use decay rates characteristic of Ahlstrom's current effluent. Upon expiration, and if the permit is administratively continued, Table 5-m of ch. NR 212 Wis. Adm. Code will apply until the permit is reissued, the reallocation is again granted, or baseline loads are modified by the Department.

Antidegradation:

For the additional BOD5 WLA to be added to Ahlstrom's Permit, the antidegradation procedures in ch. NR 207, Wis. Adm. Code must be completed. The Department must determine whether or not a significant lowering of water quality will occur according to the procedures in ch. NR 207.05 (4), Wis. Adm. Code. A significant lowering of water quality will occur if the expected dissolved oxygen (DO) in Lake Du Bay is "greater than the sum of the existing level multiplied by two-thirds and the water quality criterion multiplied by one-third," pursuant ch. NR 207.05 (4) (a) 2, Wis. Adm. Code. This can be determined using the equations below:

- $\mathbf{DO_e > DO_0 \times (2/3) + WQC \times (1/3)}$
- $\mathbf{DO_e = DO_0 - \Delta DO}$

Where:

- DO_e is the expected DO concentration in Lake Du Bay in mg/L
- DO_0 is the existing DO concentration in Lake Du Bay (8.79 mg/L average 2010-2013)
- WQC is the water quality criterion of 5.0 mg/L
- ΔDO is the maximum change in DO in Lake Du Bay of 0.18 mg/L

After solving the equations, a significant lowering of water quality is not expected to occur since the expected DO concentration in Lake Du Bay (8.61 mg/L) is greater than two-thirds the existing concentration plus one-third of the criterion (7.50 mg/L).

Since Ahlstrom discharges to the Wisconsin River which is classified as a fish and aquatic life water, and the reallocation will not result in a significant lowering of DO in Lake Du Bay, an evaluation of the treatment plant and demonstration of economic or social development must be completed pursuant chs. NR 207.04 (1) (a) and (c), Wis. Adm. Code.

The permittee's discharge has exceeded 85% of the WLA mass limit, as evidenced by the former limit exceedances. Additionally, the increased WLA will accommodate Ahlstrom's production and provide increased efficiency by allowing Ahlstrom greater operational flexibility. The Department believes that the BOD wasteload reallocation meets the requirements of ch. NR 207, Wis. Adm. Code, and increased limits can be included in the proposed permit.

APPENDIX E:

HOLDING POND EVALUATION

Ahlstrom utilizes an approximately 25 million gallon holding pond for treated and untreated wastewater and process residuals storage. It continuously receives liquid collected and pumped from a groundwater interceptor system located downgradient of the mill's on-site active landfill. Historically, the mill has utilized the pond to store leachate from its landfill, groundwater collected down gradient from its landfill, effluent during the wasteload allocation season, and spills that occur within production facilities. The Mill pumps the contents of the holding pond and blends it with the influent to the Mill's wastewater treatment system prior to discharge to the Wisconsin River. Residual solids related to this process accumulate in the pond sediment. The holding pond is located adjacent to the Mill's landfill.

The department has previously evaluated the use of the holding pond. In its February 28, 1996 final determination, the department indicated that the mill was responsible for exceedances of ground water standards. However, it was determined that the pond met the intent of ch. NR 213, Wis. Adm. Code, and approval was given based upon 4 conditions.

In the previous evaluation, it was noted that this decision would need to be revisited if conditions do not improve or appear to deteriorate.

The 4 deciding factors were:

1. The extent of groundwater contamination was expected to be minimal because the majority of contaminated water is intercepted by the landfill groundwater collection system;
2. Effects to public health, welfare and the environment were expected to be minimal because there are no potable wells between the holding pond and the river, the wetland evaluation revealed no current or anticipated adverse impacts in the area, and department staff have concluded that migration of the contaminants of concern would most likely not cause adverse impacts to the Wisconsin river, the ultimate discharge area;
3. It is expected that over time, as a result of the partial closure of the landfill, that the sodium concentrations will decrease; and
4. The facility believes that it is technically and economically infeasible to upgrade the holding pond.

As part of the previous WPDES reissuance process, the department included further monitoring and investigation requirements for Ahlstrom to evaluate and potentially upgrade the holding pond to minimize impacts to public health and the environment. Parameters to be monitored for were chosen from Tables 2, 3, and 4 of ch. NR 507, Appendix I, Wis. Adm. Code. The parameters considered included those associated with paper mill sludge and fly or bottom ash, as these were the constituents of concern within the leachate from the landfill. Monitoring wells used for data collection can be found under the 'Groundwater' section of this permit. For this next reissuance, the department is focusing the WPDES-required monitoring parameters to those which are of most concern based on the trends observed during the previous permit term. The department has also established three point-of-standard application wells, one background well, and four non-point-of-standard application wells.

Ahlstrom submitted an investigation report for the holding pond on May 30, 2017. As part of this investigation, Ahlstrom had a field visit conducted where three core samples of the sediment were collected and analyzed for density, organic content, particle size analysis, and hydraulic conductivity. Pond surface elevations were collected daily over a one-month period to document pond seepage. Measurements were collected from a vertical culvert on the northeast corner of the pond. The pond surface elevation was not observed to drop during a 23-hour period when mill operations stopped flow to the pond.

Data Evaluation

On April 6, 2017, a bathymetric survey and sediment collection were conducted to characterize the sediment and pond thickness. Bottom elevations of the pond were found to vary between 1136.4' and 1143.3'. Most of the sediment ranged

from 4 to 5 feet thick. Organic content of the individual samples ranged from 11.2% to 50.6%. Hydraulic permeabilities ranged from 2.70E-07 to 3.38E-07 cm/s.

s. NR 213.10, Table 1, Wis. Adm. Code, outlines acceptable permeabilities for soil liners in wastewater storage lagoons (see below).

Table 1
Minimum Required Liner Thickness (inches)
For Natural Soil and Soil–Bentonite Liners

Coefficient of Permeability of the Liner cm/sec (ft/day)	Wastewater Depth (ft.) 4	6	8	10	12	14	16
1×10^{-7} (2.82×10^{-4})	12	16	20	25	29	34	38
5×10^{-8} (1.41×10^{-4})	12	12	12	13	16	18	20

For all permeabilities less than those shown above, regardless of the wastewater depth, the minimum liner thickness shall be 12 inches.

s. NR 213.10(1)(b)1., Wis. Adm. Code, states: "*The design standard for the co−efficient of permeability of soil or soil−bentonite liners may not exceed 1 x 10^{-7} cm/sec.*"

Applying the conditions of the holding pond to the acceptable permeability values in NR 213, it's evident that the current holding pond has higher permeabilities than what is acceptable for soil or bentonite liners.

At the time of evaluation, the depth of wastewater in the pond was 47", or 3.9'; this corresponds to a minimum 'liner' thickness of 12". Though the pond has accumulated sediment greater than 12", this is simply the result of settling over time and is not a true 4-5-foot-thick liner. Based on the information collected, it's evident that the pond's liner does not meet the specific permeability requirements of NR 213.

The department also compared the requirements of s. NR 213.11(1)(a)-(e), Wis. Adm. Code, with the data provided in the 2017 evaluation, as follows:

- s. NR 213.11(1)(a): "*Natural soil liners shall consist of soils of which a minimum of 50% of the soil particles pass a No. 200 sieve.*"
    - For the 'Bottom' portions of cores A, B, and C, the average % passing a No. 200 sieve is 61.9%.
- s. NR 213.11(1)(b): "*Natural soil to be used as a liner shall contain less than 2% organic material, and less than 5% by weight of the natural soil to be used shall be retained on a No. 4 sieve.*"
    - All collected cores contained greater than 2% organic material. None of the cores contained any soils which were retained on a No. 4 sieve.
- s. NR 213.11(1)(c): "*Natural soil to be used as a liner shall have a plasticity index of at least 15.*"
    - The PI was not calculated for the soil samples which were taken.
- s. NR 213.11(1)(d): "*Natural soil liners shall be compacted to at least 95% of the maximum standard proctor dry density*."
- s. NR 213.11(1)(e): "*Natural soil liners shall be constructed and compacted in lifts. A lift may not exceed a compacted thickness of 6 inches.*"
    - For the 'compaction' requirements for natural soil liners in NR 213, the department has assumed that the soils have not been adequately compacted, as that would require that the pond be emptied and upgraded.

From the information provided, it's evident that the existing pond does not meet most of the NR 213-specifications for natural soil liners.

To determine whether the existing pond meets the *intent* of NR 213, the department examined the performance criteria in ss. NR 213.06(1)(a)-(c), Wis. Adm. Code:

- s. NR 213.06(1)(a): "*That pollutant dilution, dispersion or degradation will occur within the design management zone as defined in ch. NR 140.*"
- s. NR 213.06(1)(b): "*That increases of substances in the groundwater from lagoons, storage structures and treatment structures at the site will be minimized to the extent technically and economically feasible*."
- s. NR 213.06(1)(c): "*That applicable groundwater and surface water standards will not be exceeded.*"

The department also evaluated the pond in accordance with the following factors:

- s. NR 213.06(2)(a): Physical characteristics of the site, such as soil texture, soil permeability, depth to groundwater and depth to and type of bedrock.
- s. NR 213.06(2)(b): Age and condition of an existing structure.
- s. NR 213.06(2)(c): Analytical data from existing groundwater monitoring wells or any that may be installed as part of the demonstration.
- s. NR 213.06(2)(d): The quantity and composition of the materials stored or treated at the facility.
- s. NR 213.06(2)(e): The compatibility between the materials stored or treated and the lining of the storage or treatment unit.
- s. NR 213.06(2)(f): Any other information relevant to the environmental impacts of the facility's operations.

The department is tentatively allowing Ahlstrom continued use of this storage structure based on: 1) the limited groundwater exceedances observed in the downgradient wells, 2) the continued decreased usage of the holding pond, and 3) the likely low impact to public health based on there being no private or public potable wells between the holding pond and the Wisconsin River.

However, the dissolved iron and manganese concentrations in downgradient wells (807 and 805) are up to three orders of magnitude higher than the background well (803), showing that there is a clear impact to groundwater because of the exfiltration from this pond (see figures below).

The department has determined that the elevated manganese and iron concentrations are likely attributed to anaerobic conditions which are caused by the continued decomposition of the organic matter in the pond. s. NR 140.26, Wis. Adm. Code, requires response actions be taken when there are enforcement standards exceedances in point-of-standards application wells. Therefore, a schedule of action is proposed in this WPDES permit. Ahlstrom is required to identify and implement interim response actions to take to lower groundwater concentrations during the next permit term. While implementing these interim actions, Ahlstrom is also required to ultimately work towards either dredging the pond or abandoning it altogether.

The compliance schedule proposed in this permit is structured to allow Ahlstrom time to evaluate their options when it comes to either discontinuing use of this pond, and/or finding a suitable disposal route for the accumulated solids at the bottom of the pond. At the same time, the compliance schedule does not give Ahlstrom more time than necessary, as there is a recognition that, based on the data available, the pond is likely contributing to these groundwater enforcement standard exceedances.

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: June 8, 2022 FILE REF: 3400

TO: File

FROM: Woody Myers - WCR

SUBJECT: Ahlstrom Munksjo NA Specialty Solutions LLC - Land Treatment System Evaluation Report, WPDES Permit # WI-0003671

Groundwater Evaluation Summary

Table 1 Monitoring Wells

Well	Current Permit WI-0003671-08		Proposed Permit WI-0003671-09	
	Well Location	Well Designation	Well Location	Well Designation
801 OW-14	Up-gradient	Background	Up-gradient	Background
802 WP-14	Side-gradient	Non-Point of Standard	Side-gradient	Non-Point of Standard
803 OW-101	Down-gradient	Non-Point of Standard	Down-gradient	Non-Point of Standard
804 OW-101A	Down-gradient	Non-Point of Standard	Down-gradient	Non-Point of Standard
805 OW-104	Down-gradient	Non-Point of Standard	Down-gradient	Non-Point of Standard
806 OW-107	Down-gradient	Non-Point of Standard	Down-gradient	*Point of Standard
807 OW-102	Down-gradient	Non-Point of Standard	Down-gradient	*Point of Standard
808 OW-102A	Down-gradient	Non-Point of Standard	Down-gradient	*Point of Standard

* Recommended changes from previous permit

Table 2 Groundwater Standards

Parameter	Current Permit WI-0003671-08		Proposed WI-0003671-09	
	PAL	ES	PAL	ES
Depth to Groundwater	N/A	N/A	N/A	N/A
Groundwater Elevation	N/A	N/A	N/A	N/A
Nitrogen, Nitrite + Nitrate	2.0 mg/l	10.0 mg/l	2.0 mg/l	10.0 mg/l
Chloride	125 mg/l	250 mg/l	125 mg/l	250 mg/l
pH Field	6.0-8.0 su	N/A	6.0-8.0 su	N/A
pH Lab	N/A	N/A	* Note 1	
COD, Filtered	35 mg/l	N/A	35 mg/l	N/A
Nitrogen Total Kjeldahl	N/A	N/A	N/A	N/A
Nitrogen, Ammonia	0.97 mg/l	9.7 mg/l	0.97 mg/l	9.7 mg/l
Nitrogen, Organic	N/A	N/A	*2.1 mg/l	N/A
Total Dissolved Solids	370 mg/l	N/A	*450 mg/l	N/A
Alkalinity, as $CaCO_3$	270 mg/l	N/A	* Note 1	
Hardness, as $CaCO_3$	270 mg/l	N/A	* Note 1	
Conductivity	570 µmhos/cm	N/A	* Note 1	
Temperature	N/A	N/A	* Note 1	
Sulfate	125 mg/l	250 mg/l	* Note 1	
Boron	200 µg/l	1,000 µg/l	* Note 1	
Copper	130 µg/l	1,300 µg/l	* Note 1	

Parameter (continued)	Current Permit WI-0003671-08		Proposed WI-0003671-09	
	PAL	ES	PAL	ES
Manganese, Dissolved	0.025 µg/l	0.05 µg/l	*0.06 µg/l	*0.3 µg/l
Zinc	2.5 mg/l	5.0 mg/l	* Note 1	
BOD_5	N/A	N/A	N/A	N/A
Cadmium	0.5 µg/l	5.0 µg/l	* Note 1	
Iron	0.15 mg/l	0.3 mg/l	0.15 mg/l	0.3 mg/l
Lead	1.5 µg/l	15 µg/l	* Note 1	
Mercury	0.2 µg/l	2.0 µg/l	* Note 1	
Sodium	15 mg/l	N/A	* Note 1	
Total Suspended Solids	N/A	N/A	* Note 1	
Selenium	10 µg/l	50 µg/l	* Note 1	
Arsenic	1.0 µg/l	10 µg/l	* Note 1	
Barium	0.4 µg/l	2.0 µg/l	* Note 1	
Chromium	10 µg/l	100 µg/l	* Note 1	
Fluoride	0.8 mg/l	4.0 mg/l	* Note 1	
Silver	10 µg/l	50 µg/l	* Note 1	

* Recommended changes from previous permit

Note 1 These parameters are no longer required in the Wisconsin Pollutant Discharge Elimination System but may still be needed to satisfy requirements for the landfill management.

Site Information

The Ahlstrom Munksjo NA Specialty Solutions LLC (formerly Expera Specialty Solutions) is an industrial facility located on State Highway 153, Mosinee, Marathon County. Process wastewater is currently treated via recirculating sand filters and ultimately discharged to the Wisconsin River. On site there is a 25-million-gallon unlined "Treated Effluent Holding Pond" (TEHP) which receives leachate from their landfill, groundwater collected down gradient of the landfill, effluent during months in which the BOD5 wasteload allocation is difficult to achieve, and spills that occur within production facilities. The facility then pumps effluent from the TEHP to the headworks of their treatment plant. Wastewater which is held in the TEHP also seeps into the groundwater table. The TEHP is located in the NW ¼ of the SW ¼ of Section 32, T27N, R07E, Town of Mosinee.

Geology

The bedrock under this facility is an igneous intrusive consisting of tonalitic to granodioritic massive to foliated rock commonly intruded granite, aplite and pegmatite (*Bedrock Geologic Map of Wisconsin*, Wisconsin Geological and Natural History Survey (WGNHS), 1982). Bedrock is anticipated to be between 50 and 100 feet below ground surface (bgs) (*Depth to Bedrock in Wisconsin,* WGNHS, 1973). The regolith consists of material ranging from coarse sand to silt. Surface soil primarily consists of the Dunnville sandy loam and the Mosinee sandy loam (USDA NRCS Web Soil Survey).

Hydrogeology

Calculated groundwater elevation ranges between 1124 and 1167 feet above mean sea level (msl). Depth to groundwater was reported to be between 5 and 16 feet bgs. Groundwater flow direction was calculated to be to the northwest. Regional groundwater is to the north northwest (toward the Wisconsin River) in this area of Marathon County (*Water Table Elevation,* Marathon County Map, WGNHS, 1981). The site is bound on the west by a backwater of the Wisconsin River. A review of known wells was performed as a part of this evaluation. These wells include municipal, other than municipal, private and high-capacity wells. There are no recorded wells within a 1,500-foot range of this facilities groundwater discharge.

Hydraulic and Nitrogen Loading Rates

There are currently no land treatment outfalls at this facility. The groundwater monitoring was required by the department due to previous facility activities, in particular the loading of wastewater to the TEHP.

Groundwater Monitoring Network and Frequency (current permit)

Groundwater samples were to be collected semi-annually from all eight wells. Well 801 was used to calculate Preventative Action Limits (PAL) and Alternate Concentration Limits (ACL). No wells were designated and sampled as "Point of Standard Application" wells.

Table 3 Groundwater Monitoring Well Data

Sample Point	Well Name	Casing Top	Ground Surface	Screen Top	Screen Bottom	Screen Length	Well Type
801	OW-14	1172.9					
802	WP-14	1137.8					
803	OW-101	1135.6					
804	OW-101A	1135.5					
805	OW-104	1135.6					
806	OW-107						
807	OW-102	1133.7					
808	OW-102A	1133.8					

All measurements in feet
WT-Water table Observation P-Piezometer O-Other

The groundwater samples are analyzed for the parameters listed in Table 2. All of these parameters are analyzed for the aqueous or dissolved phase in groundwater. Established groundwater quality standards are found in s. NR140. 10 Table 1 Public Health Groundwater Quality Standards, and NR140.12 Table 2 Public Welfare Groundwater Standards. The thresholds of these standards are the Enforcement Standard (ES) and the PAL.

Groundwater Conditions and Exceedances

Groundwater sampling results from this facility have been analyzed for each well to evaluate trends of regulated compounds in groundwater and to calculate PALs and ACLs where appropriate. The groundwater was evaluated by looking at approximately five years of monitoring results. PALs and ACLs are calculated from this time range.

Groundwater samples were collected and sampled for many parameters in the last permit. The Wastewater Program is reducing the samples results that need to be reported through the SWAMP Switchboard system. The Waste & Materials Management Program may continue the sample analysis and report of these parameters.

Iron and manganese and TDS are the compounds that exceeded the groundwater quality standards set in the previous permit.

Proposed Groundwater Monitoring Requirements

The groundwater monitoring wells should be sampled per the frequency in Table 4 and for the parameters in the Table 5 (below). Because of the uncertainty in groundwater flow direction no changes to the PALs and ACLs are being recommended for this next permit term.

Table 4 Well Sampling Recommendations

Well Name	Sample Point	Sample Frequency	Sample Parameters	Well Designation
801	OW-14	Semi-Annual	Table 5	Background
802	WP-14	Semi-Annual	Table 5	Non-Point of Standard
803	OW-101	Semi-Annual	Table 5	Non-Point of Standard
804	OW-101A	Semi-Annual	Table 5	Non-Point of Standard
805	OW-104	Semi-Annual	Table 5	Non-Point of Standard
806	OW-107	Semi-Annual	Table 5	*Point of Standard
807	OW-102	Semi-Annual	Table 5	*Point of Standard
808	OW-102A	Semi-Annual	Table 5	*Point of Standard

* Recommended changes from previous permit

Table 5 Proposed Groundwater Standards –Permit WI-0003671-09

Parameter	PAL	ES	Source
Depth to Groundwater	N/A	N/A	Measured
Groundwater Elevation	N/A	N/A	Measured
Nitrogen, Nitrite + Nitrate	2.0 mg/l	10.0 mg/l	Table 1, NR140
Chloride	125 mg/l	250 mg/l	Table 2, NR 140
pH	6.0-8.0 su	N/A	Calculated
COD, Filtered	35 mg/l	N/A	Calculated
Nitrogen, Total Kjeldahl	N/A	N/A	Measured
Nitrogen, Ammonia	0.97 mg/l	9.7 mg/l	Table 1, NR 140
Nitrogen, Organic	*2.1 mg/l	N/A	Calculated
Total Dissolved Solids	*450 mg/l	N/A	Calculated
Manganese, Dissolved	*0.06 mg/l	*0.3 mg/l	Table 1, NR 140
BOD5	N/A	N/A	Measured
Iron, Dissolved	0.15 mg/l	0.3 mg/l	Table 2, NR 140

Conclusions

The groundwater sampling results indicates consistent exceedances of iron, manganese and TDS. Frequently the s. NR 140 Wis. Adm. Code ES has been exceeded. Because of these exceedances the department is required to impose a s. NR 140.26 Wis. Adm. Code response action. The response action for these exceedances is to continue to collect groundwater samples, have these samples analyzed for the parameters listed above and to report to the department the results of this analysis under s. NR140.20 (2) Table 6 (8) Wis. Adm. Code.

Overall, the facility is found to be in substantial compliance with regard to groundwater.

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: June 2, 2022

TO: Nate Willis – WY/3

FROM: Wade Strickland – WY/3

SUBJECT: Water Quality-Based Effluent Limitations for Ahlstrom-Munksjö NA Specialty Solutions LLC – Mosinee, WPDES Permit No. WI-0003671-09-0

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using Chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from the Ahlstrom-Munksjö NA Specialty Solutions LLC – Mosinee in Marathon County. This facility discharges to the Wisconsin River, located in the Lake Dubay-Wisconsin River Watershed in the Central Wisconsin River Basin. This discharge is included in the Wisconsin River TMDL as approved by EPA. The evaluation of the permit recommendations is discussed in more detail in the attached report.

Based on our review, the following recommendations are made on a chemical-specific basis at each outfall:

Outfall 001 – Treated Effluent

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1
BOD_5	6,534 lbs/day			3,348 lbs/day		2, 3
TSS	13,392 lbs/day			6,968 lbs/day		3
pH	9.0 s.u.	6.0 s.u.				4
Temperature						1
Phosphorus						5
Interim/TBEL				1.0 mg/L		
Final Limit				90 lbs/day		
Mercury	8.3 ng/L					
Copper	36 µg/L 4.0 lbs/day		31 µg/L 2.8 lbs/day	**31 µg/L**		6, 7
Acute WET						8, 10
Chronic WET				4.3 TUc		9, 10

Outfall 004 – Pulp Mill NCCW

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
Temperature					1
Chlorine	38 µg/L			**38 µg/L**	6

Outfall 007 – Hydro Generator NCCW

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
Copper	24 µg/L 0.015 lbs/day			**24 µg/L**	6, 7
Hardness					11

Footnotes:

1. Monitoring only
2. In addition to these categorical limits, BOD wasteload allocations from ch. NR 212, Wis. Adm. Code apply in May through October.
3. The mass limits are categorical limits based on ch. NR 284, Wis. Adm. Code. These limits are not addressed in this memo and may need to be adjusted based on current production.
4. Effluent pH is allowed to vary outside of this range if the total time of excursions is no greater than 446 minutes per calendar month, no individual excursion is longer than 60 minutes, and no individual excursion goes outside the range of 4.0 – 11.0 s.u. These limits are established according to the technology-based standards in NR 284.12 and NR 205.06 Wis. Adm. Code. Sufficient dilution is available in the Wisconsin River that these pH levels will not cause an exceedance of the 6.0 to 9.0 s.u. water quality criteria found in NR 102.04(4) Wis. Adm. Code outside of the allowable mixing zone.
5. A compliance schedule is in the current permit to meet the final WQBEL by November 1, 2023. The final water quality-based effluent limit is the Wisconsin River TMDL mass allocation in the above table.
6. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7) are included in bold.
7. This is a dissolved-based limit. Total recoverable copper is translated to dissolved copper using the equation: Cu Total Recoverable / 1.48 = Cu dissolved. At least four rounds of monitoring of total suspended solids and both total recoverable and filterable metals (copper) in the receiving water should also be required for dissolved-based limits. The monitoring (grab sampling) should take place at a point downstream that is representative of mixed receiving water and effluent, where chemical equilibrium has been reached and use low-level metals monitoring procedures.
8. Acute WET testing is recommended annually at Outfall 001. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests.
9. The Instream Waste Concentration (IWC) to assess chronic test results is 23% at Outfall 001. According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 30%, 10%, 3% & 1% at Outfall 001. The dilution water used in WET tests shall be a grab sample collected from the receiving water out of the influence of the discharges.
10. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).
11. Hardness monitoring is recommended because of the relationship between hardness and daily maximum limits based on acute toxicity criteria.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Rachel Fritz at Rachel.Fritz@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (3) – Narrative, Map & Thermal Table

PREPARED BY: Rachel Fritz Date: 6/2/22

Rachel Fritz,
Water Resources Engineer

E-cc: Nick Lindstrom, Wastewater Engineer – WCR/Eau Claire
Jason Knutson, Wastewater Section Chief – WY/3
Diane Figiel, Water Resources Engineer – WY/3
Kari Fleming, Environmental Toxicologist – WY/3

Attachment #1

Water Quality-Based Effluent Limitations for
Ahlstrom-Munksjö NA Specialty Solutions LLC – Mosinee

WPDES Permit No. WI-0003671-09-0

Prepared by: Rachel Fritz

PART 1 – BACKGROUND INFORMATION

Facility Description:
The Ahlstrom-Munksjö Mosinee Plant (Mosinee Plant) operates an unbleached integrated Kraft pulp and paper mill in Mosinee, Wisconsin, producing a variety of paper and related products. Ahlstrom-Munksjö owns the Mosinee Dam which consists of a hydroelectric turbine and Tainter gate structure adjacent to the western bank of the Wisconsin River as well as a flashboard dam located on the eastern bank. The facility is located on the eastern bank of the Wisconsin River, immediately downstream of the flashboard section of the Mosinee Dam. The Mosinee Plant's single surface water intake structure is situated directly on the eastern bank of the flashboard dam.

Process wastewater from the Mosinee Plant is treated and discharged via Outfall 001. The wastewater treatment system provides pH neutralization, primary clarification, activated sludge secondary treatment using pure oxygen, and sludge dewatering. Since process wastes from the paper mills are nutrient deficient, nutrients (primarily nitrogen and phosphorus) are added to accomplish biological treatment of the process wastewater.

The remaining outfalls (004, 007 and 008) are noncontact cooling water outfalls with some filter backwash and sump overflow/river return water to the Wisconsin River.

The plant has lowered effluent variability in the last several years, resulting in lower BOD, TSS, and phosphorus levels in the discharge. Continued efforts to improve monitoring and information availability have resulted in improved influent treatment. Outfall 003 has been retired as of 5/31/21 and the discharge has been routed to Outfall 004. The flow data from Outfall 003 is combined with Outfall 004 for the purposes of limit calculation in this memo.

Attachment #2 is a map of the area showing the approximate location of the outfalls.

Existing Permit Limitations: The current permit, which expired on May 31, 2021, includes the following effluent limitations and monitoring requirements.

In addition to the outfalls below, the permit also covers Outfall 007 for Hydro Generator NCCW and Outfall 008 for Filter Backwash Water. No limits currently apply at these outfalls, but the permit requires temperature and copper monitoring at Outfall 007 and TSS monitoring at Outfall 008.

Outfall 001 – Treated Effluent

Parameter	Daily Maximum	Daily Minimum	Monthly Average	Six-Month Average	Rolling 12-Month Average	Footnotes
Flow Rate						1
BOD_5	6,534 lbs/day		3,348 lbs/day			2, 3
TSS	13,392 lbs/day		6,968 lbs/day			3
pH	9.0 s.u.	6.0 s.u.				4
Temperature						5
Phosphorus Interim Final			0.300 mg/L	0.100 mg/L 7.8 lbs/day	1.0 mg/L	6
Mercury						1
Copper	38 µg/L 3.9 lbs/day					7
Acute WET						1
Chronic WET						1

Outfall 003 – Power and Kraft NCCW

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
Temperature	125ºF				5
Chlorine	38 µg/L		7.3 µg/L		
Copper			8.7 µg/L 0.27 lbs/day		7
Cadmium					1

Outfall 004 – Pulp Mill NCCW

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1
Temperature	125ºF				5
Chlorine	38 µg/L				1

Footnotes:

1. Monitoring only
2. In addition to these categorical limits, BOD wasteload allocations from ch. NR 212, Wis. Adm. Code apply in May through October.
3. The mass limits are categorical limits based on ch. NR 284, Wis. Adm. Code. These limits are not addressed in this memo and may need to be adjusted based on current production.
4. Effluent pH is allowed to vary outside of this range if the total time of excursions is no greater than 446 minutes per calendar month, no individual excursion is longer than 60 minutes, and no individual excursion goes outside the range of 4.0 – 11.0 s.u. These limits are established

according to the technology-based standards in NR 284.12 and NR 205.06 Wis. Adm. Code. Sufficient dilution is available in the Wisconsin River that these pH levels will not cause an exceedance of the 6.0 to 9.0 s.u. water quality criteria found in NR 102.04(4) Wis. Adm. Code outside of the allowable mixing zone.

5. The permit includes a compliance schedule to meet the following temperature limits at each outfall by 5/31/2021:

Month	Outfall 001		Outfall 003		Outfall 004	
	Weekly Ave Limit (°F)	Daily Max Limit (°F)	Weekly Ave Limit (°F)	Daily Max Limit (°F)	Weekly Ave Limit (°F)	Daily Max Limit (°F)
Jan	-	-	49	76	-	-
Feb	-	-	50	76	-	-
Mar	-	-	52	76	-	-
Apr	-	-	55	78	-	-
May	84	-	65	82	79	-
Jun	96	-	75	85	89	-
Jul	100	-	80	86	94	-
Aug	104	-	79	85	95	-
Sep	101	-	72	84	91	-
Oct	-	-	61	80	-	-
Nov	-	-	50	77	-	-
Dec	-	-	49	76	-	-

6. A compliance schedule is in the current permit to meet the final WQBEL by November 1, 2023.
7. This is a dissolved-based limit. Total recoverable copper is translated to dissolved copper using the equation: Cu Total Recoverable / 1.26 = Cu dissolved

Receiving Water Information:

- Name: Wisconsin River
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm water sport fish community, non-public water supply.
  Low Flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The river flow in this segment of the Wisconsin River is heavily managed and dependent on dam operations.

  <u>Outfalls 001, 004, 007, and 008 – East Bank</u>
  The minimum seepage through the dam in the east channel of the Wisconsin River was determined to be 220 cfs in a November 12, 2019 study and approved by the department on January 30, 2020. This is the lowest expected flow in the east channel and the flow used in limit calculations in this evaluation.
  $7\text{-}Q_{10}$ = 220 cfs (cubic feet per second)
  $7\text{-}Q_2$ = 220 cfs
  $90\text{-}Q_{10}$ = 220 cfs
  Harmonic Mean Flow = 220 cfs

- Hardness = 49 mg/L as $CaCO_3$. This value represents the geometric mean of data from WET testing from 2013 to 2022.
- % of low flow used to calculate limits in accordance with s. NR 106.06 (4) (c) 5., Wis. Adm. Code: The facility has submitted thermal mixing zone studies for Outfalls 001 and 004 on June 19, 2014 and

May 1, 2020. These studies demonstrated that adequate mixing exists for temperature limits at these outfalls (65% mixing at Outfall 001 and 100% at Outfall 004). A default 25% mixing zone is used in limit calculations for all other pollutants and at Outfalls 007 and 008.

- Source of background concentration data: Mercury background concentrations come from intake water monitoring at the facility. All other metals data used in this evaluation are from the Wisconsin River at Conover. Chloride data is from the Wausau Dam (Station ID 373001). The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations.
- Multiple dischargers: No other permittees discharge nearby. Outfalls 004 discharges about 650 ft from Outfall 001 in the east channel. However, a May 1, 2020 plume mapping study demonstrated that these mixing zones do not overlap. Outfalls 007 and 008 also discharge near each other, however these discharges are much smaller compared to the amount of dilution available (Qs:Qe > 1000:1), so these mixing zones are not expected to overlap.
- Impaired water status: This segment of the Wisconsin River is listed as impaired for PCBs and Mercury. Downstream, at Petenwell Lake, the Wisconsin River is also impaired for phosphorus.

Effluent Information:

- Flow Rates: The following flow statistics are based on flow data from May 2017 to April 2022. The maximum 365-day average flow rates are used for limit calculations in this evaluation.

	001	**003**	**004**	**007**	**008**
Maximum 365-Day Average	10.76	3.03	16.66	0.0720	0.0234
Peak Daily	13.34	4.50	59.00	0.0720	0.0720
Peak 7-Day Average	12.31	4.36	33.40	0.0720	0.0720
Peak 30-Day Average	11.65	4.22	20.38	0.0720	0.0720
Overall Average	10.22	2.05	14.27	0.0720	0.0106

Outfall 003 was retired on 05/31/2021 and the discharge has been routed to Outfall 004. Therefore the combined discharge of 19.69 MGD from Outfalls 003 and 004 is used in limit calculations for Outfall 004.

- Hardness: Outfall 001 = 80 mg/L as $CaCO_3$, Outfall 008 = 53 mg/L as $CaCO_3$. These values represent the geometric mean of WET testing data from 2013 to 2022 and permit application monitoring data from 2020. Because the characteristics of the Outfall 008 discharge are similar to those in the discharges from Outfalls 003, 004, and 007, the hardness's from all of these discharges are expected to be similar. An effluent hardness of 53 mg/L as $CaCO_3$ is also used at Outfalls 004 and 007 in this evaluation.
- Acute dilution factor used in accordance with s. NR 106.06 (3) (c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water Source: Intake water from the Wisconsin River (99.5%) with a small amount of municipal water from the City of Mosinee. The intake structure is located upstream of the dam, so the intake water is not a fraction of the 220 cfs of seepage through the dam. For this reason, an f value of 0 instead of 1 is used in limit calculations.
- Additives: Nine water quality conditioners are used at the facility which may be present in the discharge from Outfall 001. These are evaluated in Part 8 of the memo. Chlorine and sodium thiosulfate to treat the chlorine residual are used at Outfall 004.
- Effluent characterization: This facility is categorized as an industrial discharger, so the permit application required effluent sample analyses for all the "priority pollutants" except for the Dioxins and Furans as specified in s. NR 200.065, Table 1, Wis. Adm. Code at Outfall 001. The permit-

required monitoring for Cd, Cu, and Hg from May 2017 to April 2022 is used in this evaluation.

Copper µg/L			
	Outfall 001	Outfall 003	Outfall 007
1-day P_{99}	73	23	44
4-day P_{99}	41	13	26
30-day P_{99}	18	6.3	11
Mean	8.4	3.3	2.4
Std	18	5.8	25
Sample size	133	58	56
Range	<1.3 - 150	<1.6 - 22	<1.3 - 88

"<" means that the pollutant was not detected at the indicated level of detection. The mean concentration was calculated using zero in place of the non-detected results.

Mercury ng/L		
	Outfall 001	Intake Water (601)
1-day P_{99}	5.4	8.3
4-day P_{99}	3.4	5.1
30-day P_{99}	2.3	3.6
Mean	1.9	2.8
Std	1.0	1.6
Sample size	19	19
Range	0.66 - 5.2	1.1 - 7.4

Manganese µg/L		
	Outfall 001	Intake Water (601)
09/09/2020	160	
06/04/2021	350	95
06/07/2021	380	95
06/08/2021	340	110
06/09/2021	300	130
06/10/2021	290	5.4
06/11/2021	270	130
06/14/2021	180	110
06/15/2021	170	110
06/16/2021	190	120
06/17/2021	260	110
1-day P_{99}	489.4	
4-day P_{99}	370.2	
30-day P_{99}	305.9	

Attachment #1

Sample Date	Cadmium µg/L
	Outfall 003
04/02/2018	0.26
01/07/2019	0.41
(the remaining 41 sample results were non-detect)	
Average	0.016

Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled "MEAN EFFL. CONC.".

The following table presents the average concentrations and loadings from May 2017 to April 2022 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6):

	Outfall 001	Outfall 003	Outfall 004
BOD_5	1059 lbs/day		
TSS	2090 lbs/day		
pH field	6.4 s.u.		
Phosphorus	0.32 mg/L		
Temperature	94°F	64°F	67°F
Copper	9.0 µg/L* 0.86 lbs/day	4.5 µg/L* 0.16 lbs/day	
Chlorine		<100 µg/L*	<100 µg/L*
Cadmium		0.016 µg/L*	

*Results below the level of detection (LOD) were included as zeroes in calculation of average.

PART 2 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR TOXIC SUBSTANCES – EXCEPT AMMONIA NITROGEN

Permit limits for toxic substances are required whenever any of the following occur:

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or P_{99}) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q_{10}

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Adm. Code (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q_{10} receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards.

$$\text{Limitation} = \frac{(WQC)\,(Qs + (1-f)\,Qe) - (Qs - f\,Qe)\,(Cs)}{Qe}$$

Where:

WQC =Acute toxicity criterion or secondary acute value according to ch. NR 105

Qs = average minimum 1-day flow which occurs once in 10 years (1-day Q_{10})
if the 1-day Q_{10} flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q_{10}).

Qe = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

f = Fraction of the effluent flow that is withdrawn from the receiving water, and

Cs = Background concentration of the substance (in units of mass per unit volume) as specified in s. NR 106.06(4)(e), Wis. Adm. Code.

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q_{10} method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for the Mosinee Plant at all outfalls and the limits are set based on two times the acute toxicity criteria.

The following tables list the calculated water quality-based effluent limitations for this discharge along with the results of effluent sampling for all the detected substances. All concentrations are expressed in terms of micrograms per Liter (µg/L), except for hardness and chloride (mg/L) and mercury (ng/L).

The effluent data used at Outfall 004 is a flow-weighted average of Outfalls 003 and 004 because Outfall 003 has been rerouted to Outfall 004. Cadmium data shown in the tables below come from monitoring at Outfall 003 and the copper and chloride data is a flow weighted average of monitoring at Outfalls 003 and 004.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

Outfalls 001

RECEIVING WATER FLOW = 220 cfs, (1-Q_{10} (estimated as 80% of 7-Q_{10})), as specified in s. NR 106.06 (3) (bm), Wis. Adm. Code.

					Outfall 001		
SUBSTANCE	REF. HARD. mg/L	ATC	MAX. EFFL. LIMIT*	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Chlorine		19.0	38.1	7.61			
Arsenic		340	679.6	135.9	<2.6		
Cadmium	81	8.1	16.1	3.2	<0.19		
Chromium (+3)	81	1511	3022.9	605	<0.83		
Chromium (+6)†		16.0	32.0	6.41	3.1		
Copper	81	12.7	25.3			**73**	32
Lead	81	87	173.7	34.7	10		
Mercury (ng/L)		830	1660			5.5	5.2
Nickel	81	391	782.0	156	<3.5		
Zinc	81	100	199.4	39.9	9.7		

Chloride (mg/L)		757	1514.0	303	28		
Phenol**		4460.3	4460.3	892.1	0.066		
Manganese**		3719	3719			489.4	380
Barium**		3077.3	3077.3	615	43		

* The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q_{10} flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.
** The limit for this substance is based on a secondary value. Acute limits are set equal to the secondary value rather than two times or using the 1-Q_{10} s. NR 106.06(3)(b)2 and s. NR 105.05(2)(f)6), Wis. Adm Code.
†A hexavalent chromium result of 3.1 µg/Lwas reported for Outfall 001 on the permit application, but this result is higher than the corresponding total recoverable chromium result of <0.83 µg/L. Its known that hexavalent chromium tests are prone to interferences, and so this result is excluded from the evaluation.

Outfall 004

RECEIVING WATER FLOW = 220 cfs, (1-Q_{10} (estimated as 80% of 7-Q_{10})), as specified in s. NR 106.06 (3) (bm), Wis. Adm. Code

					Outfall 003 and 004 combined		
SUBSTANCE	REF. HARD. mg/L	ATC	MAX. EFFL. LIMIT*	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Chlorine		19.0	38.1	7.61			
Cadmium	53	5.0	10.1	2.0	0.0024		
Copper	53	8.6	17.2			3.6	3.4
Chloride (mg/L)		757	1514.0	303	16		

* Per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016 consideration of ambient concentrations and 1-Q_{10} flow rates yields a more restrictive limit than the 2 × ATC method of limit calculation.

Outfalls 007 and 008

RECEIVING WATER FLOW = 220 cfs, (1-Q_{10} (estimated as 80% of 7-Q_{10})), as specified in s. NR 106.06 (3) (bm), Wis. Adm. Code.

					Outfall 007			Outfall 008
SUBSTANCE	REF. HARD. mg/L	ATC	MAX. EFFL. LIMIT*	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.	MEAN EFFL. CONC.
Chlorine		19.0	38.1	7.61				10
Arsenic		340	679.6	135.9				<2.6
Cadmium	53	5.0	10.1	2.0				<0.19
Chromium	53	1080	2160.1	432				<0.83
Copper	53	8.6	17.2	3.4		**44**	**88**	<1.9
Lead	53	58	116.8	23.4				<4.3
Nickel	53	276	552.7	111				<3.5
Zinc	53	70	139.3	27.9				5.7
Chloride (mg/L)		757	1514.0	303	12			13

* The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-Q_{10} flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.

Attachment #1

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

Outfalls 001

RECEIVING WATER FLOW = 55 cfs (¼ of the 7-Q_{10}), as specified in s. NR 106.06 (4) (c), Wis. Adm. Code

						Outfall 001	
SUBSTANCE	REF. HARD. mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Chlorine		7.28		31.34	6.27		
Arsenic		152.2		655.16	131.0	<2.6	
Cadmium	49	1.41	0.025	5.99	1.20	<0.19	
Chromium (+3)	49	73.68	0.836	314.40	62.9	<0.83	
Chromium (+6)[†]		10.98		47.26	9.45	3.1	
Copper	49	5.62	1.093	20.58			**40.8**
Lead	49	14.06	0.95	57.38	11.5	10	
Mercury (ng/L)		440	2.75	1884.92			3.40
Nickel	49	28.56		122.94	24.6	<3.5	
Zinc	49	64.53		277.77	55.6	9.7	
Chloride (mg/L)		395	3.6	1688.41	337.7	28	
Phenol		2197.2		9458.00	1891.6	0.066	
Manganese		1372		5907			370.2
Barium		170.96		735.91	147.2	43	

[†]A hexavalent chromium result of 3.1 µg/Lwas reported for Outfall 001 on the permit application, but this result is higher than the corresponding total recoverable chromium result of <0.83 µg/L. Its known that hexavalent chromium tests are prone to interferences, and so this result is excluded from the evaluation.

Outfall 004

RECEIVING WATER FLOW = 55 cfs (¼ of the 7-Q_{10}), as specified in s. NR 106.06 (4) (c), Wis. Adm. Code

						Outfall 003 and 004 Combined	
SUBSTANCE	REF. HARD. mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Cadmium	49	1.41	0.025	3.99	0.80	0.0024	
Copper	49	5.62	1.09	14.06			2.0
Chloride (mg/L)		395	3.6	1262.65	252.5	16	

Outfalls 007

RECEIVING WATER FLOW = 55 cfs (¼ of the 7-Q_{10}), as specified in s. NR 106.06 (4) (c), Wis. Adm. Code

						Outfall 007	
SUBSTANCE	REF. HARD. mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}
Copper	49	5.62	1.093	2241			26
Chloride (mg/L)		395	3.6	193630	38726	12	

Outfall 008
RECEIVING WATER FLOW = 55 cfs (¼ of the 7-Q_{10}), as specified in s. NR 106.06 (4) (c), Wis. Adm. Code

						Outfall 008
SUBSTANCE	REF. HARD. mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Chlorine		7.28		11066	2213	-
Arsenic		152.2		231356	46271	<2.6
Cadmium	49	1.41	0.025	2105	421	<0.19
Chromium	49	73.68	0.836	110730	22146	<0.83
Copper	49	5.62	1.093	6883	1377	<1.9
Lead	49	14.06	0.95	19929	3986	<4.3
Nickel	49	28.56		43414	8683	<3.5
Zinc	49	64.53		98091	19618	5.7
Chloride (mg/L)		395	3.6	594963	118993	28

Monthly Average Limits based on Wildlife Criteria (WC)

Outfall 001
RECEIVING WATER FLOW = 110 cfs (50% of the 90-Q_{10}), as specified in s. NR 106.06 (4), Wis. Adm. Code

SUBSTANCE	WC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}
Mercury (ng/L)	1.3	2.75	1.3	-	-	**2.34**

At the other outfalls, the effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

Monthly Average Limits based on Human Threshold Criteria (HTC)

No substances for which Human Threshold Criteria exist were detected at Outfalls 004, 007 and 008.

Outfall 001
RECEIVING WATER FLOW = 55 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P99
Antimony	373		1606	321.1	2.7	
Cadmium	370	0.025	1593	318.5	<0.19	
Chromium (+3)	3818000	0.836	1.64E+07	3.29E+06	<0.83	
Lead	140	0.95	600	119.9	10	
Mercury (ng/L)	1.5	2.75	1.5			2.34
Nickel	43000		185097	37019	<3.5	

Outfall 004

RECEIVING WATER FLOW = 55 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

					Outfalls 003 and 004 Combined	
SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P99
Cadmium	370	0.025	1060	212	0.0024	

Monthly Average Limits based on Human Cancer Criteria (HCC)

No substances for which Human Threshold Criteria exist were detected at Outfalls 003, 004 and 007.

Outfall 001

RECEIVING WATER FLOW = 55 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3		57.3	11.45	<2.6
Chloroform	1960		8437	1687	18
Dichlorobromomethane	1960		8437	1687	0.30

Outfall 008

RECEIVING WATER FLOW = 55 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3		20217.1	4043.42	<2.6

In addition to evaluating the need for limits for each individual substance for which HCC exist, s. NR 106.06(8), Wis. Adm. Code, requires the evaluation of the cumulative cancer risk. Because no effluent limits are needed based on HCC, determination of the cumulative cancer risk is not needed per s. NR 106.06(8), Wis. Adm. Code.

Conclusions and Recommendations: Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are required for chlorine at Outfall 004, copper at Outfalls 001 and 007 and mercury at Outfall 001.

Outfall 004: Total Residual Chlorine – Because chlorine is added in the discharge from Outfall 004, effluent limitations are recommended to assure proper chlorine removal. Specifically, **a daily maximum limit of 38 µg/L** is required. Due to revisions to s. NR 106.07(2), Wis. Adm. Code, mass limitations are no longer required. Weekly average limitations are not needed based on reasonable potential as the daily maximum limitations will provide adequate protection of the resource. Additional limits are discussed in the expression of limits section of this memo.

Outfalls 001 and 007: Copper – Considering available effluent data from the current permit term (May 2017 to April 2022), copper limits are needed at Outfalls 001 and 007.

At Outfall 001, the 1-day P_{99} concentration of 73 µg/L exceeds the 25 µg/L daily maximum limit and the 4-day P_{99} concentration of 41 µg/L exceeds the 5.6 µg/L weekly average limit. Therefore, a **daily maximum limit of 25 µg/L and a weekly average limit of 21 µg/L are required** in the reissued permit. **The daily max mass limitation of 2.8 lbs/day** is based on the concentration limit and the daily max flow rate of 13.34 MGD (25 µg/L* 13.34 MGD * 8.34/1000) in accordance with s. NR 106.07(2)(a), Wis. Adm. Code. **The weekly average mass limitation of 1.8 lbs/day** is based on the concentration limit and the max annual average flow rate of 10.76 MGD (21 µg/L* 10.76 MGD * 8.34/1000) in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

At Outfall 007, the 1-day P_{99} concentration of 53 µg/L exceeds the 17 µg/L daily maximum limit. Therefore, a **daily maximum limit of 17 µg/L** is required in the reissued permit. **The daily max mass limitation of 0.010 lbs/day** is based on the concentration limit and the daily max flow rate of 0.072 MGD (17 µg/L* 0.072 MGD * 8.34/1000) in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

These limits are based on the total recoverable criteria. Dissolved-based limits may be included in the reissued permit in place of the limits listed above. The updated dissolved-based limits are calculated at the end of this memo.

Quarterly hardness monitoring is also recommended because of the relationship between hardness and daily maximum limits based on acute toxicity criteria.

Outfall 001: Manganese – The secondary acute and chronic values for manganese come from hardness based equations shown below. The secondary acute value is calculated using the effluent hardness and the secondary chronic value is calculated based on the receiving water hardness. Comparing the calculated limits to the respective P_{99} values shown in the tables above shows no reasonable potential to exceed manganese limits.

$$Secondary\ Criteria = e^{V*\ln(hardness)+\ln(ACI)}$$

Where:

V= 0.8787
ln ACI for acute = 4.364
ln ACI for chronic = 3.804

Outfall 001: Mercury – The 30-day P_{99} of representative effluent data at Outfall 001 is 2.34 ng/L, which is greater than the most stringent limit (wildlife criterion of 1.3 ng/L); therefore, a limit would be required for mercury.

Updates to s. NR 106.06(6), Wis. Adm. Code, allow a facility to demonstrate that an intake pollutant in the discharge does not cause, have the reasonable potential to cause, or contribute to the excursion of water quality criteria in the receiving water. The demonstration has five conditions:

1. The permittee withdraws 100 percent of its intake water containing the substance from the same body of water into which the discharge is made;
2. The permittee does not contribute any additional mass of the substance to the wastewater;
3. The permittee does not alter the substance chemically or physically in a manner that would cause adverse water quality impacts to occur that would not occur if the pollutants were left in-stream;
4. The permittee does not increase the concentration at the edge of the mixing zone, or at the point of discharge if a mixing zone is not allowed, as compared to the concentration in the intake water,

unless the increased concentration does not cause or contribute to an excursion above an applicable water quality standard; and

5. The timing and location of the discharge would not cause adverse water quality impacts to occur that would not occur if the identified intake pollutant were left instream.

The permit required quarterly mercury monitoring at Outfall 001 and the intake at sampling point 601 is summarized below. In all but four of the paired sample results, effluent concentrations were lower than intake concentrations. The P_{99} concentrations and average of effluent data are also lower than those for statistics in the intake data. Therefore, condition four is met.

Mercury Concentration (ng/L)					
Sample Date	**Intake (Sampling Point 701)**	**Outfall 001**	**Sample Date**	**Intake (Sampling Point 701)**	**Outfall 001**
08/23/2017	2.10	1.80	08/12/2020	2.70	1.90
10/12/2017	2.90	2.50	11/16/2020	3.60	1.50
03/19/2018	1.20	5.20	01/18/2021	1.10	1.60
06/04/2018	3.20	3.10	05/13/2021	2.90	0.58
09/04/2018	1.90	0.66	07/19/2021	2.20	2.10
11/12/2018	3.90	1.20	11/09/2021	1.10	1.50
03/04/2019	1.20	0.75	01/17/2022	1.60	1.40
04/16/2019	4.70	2.70			
07/22/2019	7.40	1.20	1-day P_{99}	8.3	5.5
10/24/2019	4.40	1.80	4-day P_{99}	5.1	3.4
01/28/2020	1.80	2.20	30-day P_{99}	3.6	2.3
05/06/2020	3.60	1.50	Mean	2.8	1.9

The discharge from Outfall 001 contains process wastewater from the paper mill which is known to be a mercury source, so the discharge contributes a mass of mercury to the discharge via facility processes even though this mass may be removed by treatment prior to discharge. Therefore, condition two is not met.

However, conditions 3, 4, and 5 are met, so therefore the mercury limit is set equal to the 1-day P_{99} of receiving water data in accordance with s. NR 106.06(6)(c)2a, Wis. Adm. Code. **A mercury limit of 8.3 ng/L as a daily max is recommended at Outfall 001 in the reissued permit.**

PART 3 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR AMMONIA NITROGEN

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. Given the fact that the Mosinee Plant does not currently have ammonia nitrogen limits the need for limits is evaluated at this time.

The 2020 permit application monitoring results for each outfall are as follows:

Sample Date	Ammonia Nitrogen mg/L				
	Outfall 001	Outfall 003	Outfall 004	Outfall 007	Outfall 008
09/09/2020	<0.04	0.15	0.11	0.11	0.15
09/12/2020	3.4				0.092
09/15/2020	0.22				0.083
09/18/2020	0.41				0.15
Average	1.0				0.12

Considering the amount of dilution available, these effluent results are much lower than the lowest limits that would be calculated. No ammonia monitoring or limits are recommended in the reissued permit.

PART 4 – PHOSPHORUS

Technology Based Phosphorus Limit

Subchapter II of Chapter NR 217, Wis. Adm. Code, requires industrial facilities that discharge greater than 60 pounds of Total Phosphorus per month to comply with a 12-month average limit of 1.0 mg/L, or an approved alternative concentration limit.

Because the Mosinee Plant currently has a limit of 1.0 mg/L, this limit should be included in the reissued permit. This limit remains applicable unless a more stringent water quality-based concentration limit is given. In addition, the need for a WQBEL for phosphorus must be considered.

Wisconsin River TMDL Limits

Total phosphorus (TP) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs (*May 2020). The wasteload allocations (WLA) that implement site-specific criteria for Lakes Petenwell, Castle Rock, and Wisconsin are found in Appendix K of the *Total Maximum Daily Loads for Total Phosphorus in the Wisconsin River Basin (WRB TMDL)* report dated April 26, 2019 and are expressed as maximum annual loads (lbs/year) and maximum daily loads (lbs/day). The WLA that implement statewide criteria found in Appendix J of the TMDL report are no longer applicable following approval of these site-specific criteria. The daily WLAs in the WRB TMDL equals the annual WLA divided by the number of days in the year. Therefore, the daily WLA is an annual average. Since the derivation of daily WLAs from annual WLAs does not take effluent variability or monitoring frequency into consideration, maximum daily WLAs from the WRB TMDL should not be used directly as permit effluent limits.

For the reasons explained in the April 30, 2012 paper entitled *Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin*, WDNR has determined that the phosphorus WQBELs set equal to daily WLAs would not be consistent with the assumptions and requirements of the TMDL.

Therefore, limits given to continuously discharging facilities covered by the WRB TMDL are given monthly average mass limits. If the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits are also included. The following equation shows the calculation of equivalent effluent concentration:

Total Phosphorus Wasteload Allocation: 12,043 lbs/year = 33.0 lbs/day (from Appendix K of the TMDL document)

Outfalls 004, 007, and 008 are made up of non-contact cooling water and untreated river water with only chlorine and dechlorination additives not containing phosphorus. Therefore the TMDL limits will apply only to Outfall 001.

TP Equivalent Effluent Concentration = Daily WLA ÷ (Flow Rate * Conversion Factor)
= 33.0 lbs/day ÷ (10.76 MGD * 8.34)
= 0.368 mg/L

Since this value is greater than 0.3 mg/L, the WLA should be expressed as a monthly average mass limit for total phosphorus and no six-month average limit is required.

Typically, a monthly average limit is calculated based on the coefficient of variation (CV) of mass discharge data. In this case, the CV is 2.86, which is very high. A monthly average limit calculated based on this CV would equal 213 lbs/day, which is equivalent to an annual discharge rate of 77,585 lbs/year and not an appropriate limit to attain the annual WLA of 12,043 lbs/year.

Previous annual average and total mass discharges are summarized in the table below. In all but one year, the annual WLA of 12,043 lbs/year was met. From May 2017 to April 2022, 12% of the rolling 12-month mass sums did not meet the annual WLA. Therefore, some phosphorus reductions will be needed to meet the TMDL WLA. These reductions will likely result in reductions in effluent variability, which will lower the CV. When reductions in CV are expected, a default CV of 0.6 is typically used to calculate TMDl limits. However the discharge is fairly close to attainment of the TMDL wasteload allocations and effluent variability most likely does not need to be decreased so significantly in order to reliably attain the TMDL wasteload allocations.

Year	Annual Average Phosphorus Mass (lbs/day)	Annual Total Phosphorus (lbs/year)
2016	10.31	3,764
2017	14.94	5,452
2018	20.04	7,313
2019	24.99	9,122
2020	54.37	19,846
2021	23.02	8,401

On 10/11/2020, the reported effluent phosphorus concentration was 8.5 mg/L and the mass discharge was 783 lbs/day. This was by far the highest daily phosphorus discharge; the second highest daily discharge was 149 lbs/day. When this outlier is removed from the dataset, the new calculated CV is 1.07. This CV is much more typical for this category of discharge. High discharge events like that on 10/11/2020 will be less likely to occur as the facility pursues phosphorus reductions and optimizes treatment. Therefore the CV of 1.07 is used to calculate the phosphorus limit.

TP Monthly Average Permit Limit = daily WLA * monthly average multiplier

= 33 lbs/day * 2.73
= 90 lbs/day

The multiplier used in the monthly average calculation was used as recommended in the TMDL implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 1.07. The facility has met the permit limits based on the WLA in all but two months in the last five years so the current CV is used. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as bimonthly; if a different monitoring frequency is used, the stated limits should be reevaluated.

Weekly monitoring is recommended in the reissued permit. Additional monitoring will be helpful to characterize the effluent given the somewhat high variability in phosphorus discharges. The same 90 lbs/day monthly average limit is recommended for a weekly average monitoring frequency.

The WRB TMDL establishes TP wasteload allocations to reduce the loading in the entire watershed including WLAs to meet water quality standards, for tributaries to the Wisconsin River. Therefore, WLA-based WQBELs are protective of immediate receiving waters and TP WQBELs derived according to s. NR 217.13, Wis. Adm. Code are not required.

Effluent Data
An interim limit is needed when a compliance schedule is included in the permit to meet the TMDL limits. This limit should reflect a value which the facility is able to currently meet; however, it should also consider the receiving water quality, keeping the water from further impairment. It is recommended that the **interim limit be set equal to the TBEL of 1.0 mg/L**, expressed as a monthly average, since this value is lower than the 4-day P_{99} concentration.

The following table lists the statistics for effluent phosphorus levels from May 2017 to April 2022, with and without the highest outlier excluded from the dataset. In the cases where reporting the mass discharge is not required in the current permit, the mass is calculated using the reported phosphorus concentration and the effluent flow rate for that day.

Total Phosphorus				
	Concentration mg/L	Mass Discharge lbs/day	Concentration* mg/L	Mass Discharge* lbs/day
1-day P_{99}	3.2	284	1.3	113
4-day P_{99}	1.9	175	0.69	61
30-day P_{99}	0.80	73	0.38	33
Mean	0.32	28	0.25	22
Std	0.80	74	0.26	23
Sample Size	118	118	117	117
Range	0.03 - 8.5	2.58 - 783	0.03 - 1.5	2.58 - 149

*Data from 10/11/2020 excluded

Conclusions:
In summary, the following limits are recommended by this evaluation:

- Monthly average Total Phosphorus concentration limit of 1.0 mg/L (This limit functions as the

interim limit and TBEL.)

- Monthly average Total Phosphorus mass limit of 90 lbs/day (This is the final limit which takes effect at the end of the compliance schedule.)

PART 5 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in chs. NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. Daily maximum and weekly average temperature criteria are available for the 12 different months of the year depending on the receiving water classification.

At Outfall 007 and 008, due to the amount of upstream flow available for dilution in the limit calculation (Qs:Qe >20:1), the lowest calculated limitation is 120° F (s. NR 106.55(6)(a), Wis. Adm. Code).

The facility has submitted thermal mixing zone studies for Outfalls 001 and 004 on June 19, 2014 and May 1, 2020. Based on the study findings, a mixing zone of 65% is allowed at Outfall 001 and 100% is allowed at Outfall 004 for calculating temperature limits. Temperature limits for Outfall 004 are calculated using the combined flow rate from Outfalls 003 and 004 and the flow-weighted average temperatures.

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from May 2017 to April 2022.

The table below summarizes the temperature limits and the maximum temperatures reported during monitoring from May 2017 to April 2022 for Outfalls 001 and 004. Temperature data from December 2015 to January 2021 is used at Outfall 007 to include temperature data from each month of the year.

Attachment #1

	Outfall 001				Outfall 004 (with Outfall 003 flow)			
Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit		Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum (°F)	Daily Maximum (°F)	Weekly Maximum (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	94	96	NA	120	55	63	NA	120
FEB	93	96	NA	120	56	77	NA	120
MAR	96	98	NA	120	57	75	NA	120
APR	102	103	NA	120	69	71	102	120
MAY	105	109	106	120	103	117	105	120
JUN	107	109	114	120	107	112	109	120
JUL	107	108	118	120	112	115	118	120
AUG	106	108	NA	120	102	109	119	120
SEP	103	104	NA	120	98	105	119	120
OCT	102	103	NA	120	84	92	NA	120
NOV	97	100	NA	120	57	68	NA	120
DEC	93	96	NA	120	53	79	NA	120

	Outfall 007			
Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Average Effluent Limitation (°F)	Weekly Average Effluent Limitation (°F)	Weekly Average Effluent Limitation (°F)	Weekly Average Effluent Limitation (°F)
JAN	39	39	NA	120
FEB	50	50	NA	120
MAR	57	57	NA	120
APR	75	75	NA	120
MAY	68	68	NA	120
JUN	72	72	NA	120
JUL	92	92	NA	120
AUG	79	79	NA	120
SEP	63	63	NA	120
OCT	65	65	NA	120
NOV	57	57	NA	120
DEC	45	45	NA	120

No temperature monitoring data is available at Outfall 008. However, temperatures are expected to be

very similar to Outfall 007 and are not expected to exceed 120°F.

Reasonable Potential
Permit limits for temperature are recommended based on the procedures in s. NR 106.56, Wis. Adm. Code.

- An acute limit for temperature is recommended for each month in which the representative daily maximum effluent temperature for that month exceeds the acute WQBEL. The representative daily maximum effluent temperature is the greater of the following:
  (a) The highest recorded representative daily maximum effluent temperature
  (b) The projected 99th percentile of all representative daily maximum effluent temperatures
- A sub−lethal limitation for temperature is recommended for each month in which the representative weekly average effluent temperature for that month exceeds the weekly average WQBEL. The representative weekly average effluent temperature is the greater of the following:
  (a) The highest weekly average effluent temperature for the month.
  (b) The projected 99th percentile of all representative weekly average effluent temperatures for the month

Based on the available effluent data, no effluent limits are recommended for temperature. The complete thermal tables used for calculation are attached.

The current temperature limits may be removed since the anti-backsliding requirements in ch. NR 207, Wis. Adm. Code are met.

PART 6 – WHOLE EFFLUENT TOXICITY (WET)

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. Decisions below related to the selection of representative data and the need for WET limits were made according to ss. NR 106.08 and 106.09, Wis. Adm. Code. WET monitoring frequency and toxicity reduction evaluation (TRE) recommendations were made using the best professional judgment of staff familiar with the discharge after consideration of the guidance in the WET Program Guidance Document (October 29, 2019).

Outfalls 007 and 008 are non-contact cooling water discharges with no history of WET failures, no toxic compounds detected at levels of concern, and a Qs:Qe ratio greater than 1000:1. Because there is a very low risk of toxicity from these discharges, no WET testing is recommended for these outfalls.

Outfall 004 is also a non-contact cooling water discharge, but toxic compounds have been detected at a level of concern in the discharges. The need for WET testing at these outfalls is considered along with Outfall 001 below.

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC_{50} (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09 (2) (b), Wis. Adm Code.

- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms

during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC_{25} (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09 (3) (b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC values for each outfall shown in the table below and the WET Checklist summary are calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

$$IWC\ (as\ \%) = Q_e \div \{(1 - f)\ Q_e + Q_s\} \times 100$$

Where:

Q_e = annual average flow

f = fraction of the Q_e withdrawn from the receiving water = 0 (Intake water is withdrawn upstream of the dam, and therefore is not a fraction of Q_s)

Q_s = ¼ of the 7-Q_{10}

	Q_e	Q_s	IWC
Outfall 001	16.67 cfs	55 cfs	23%
Outfall 004 (with 003 flow)	30.52 cfs	55 cfs	36%

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Table A, Wis. Adm. Code), receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in chronic WET tests shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge. The specific receiving water location must be specified in the WPDES permit.

- Shown below is a tabulation of all available WET data for Outfall 001. No WET data are available at the other outfalls. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08 (3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations. Significant changes were made to WET test methods in 2004 and these changes were assumed to be fully implemented by certified labs by no later than June 2005. Therefore, WET testing from before 2004 is not used to determine reasonable potential.

Attachment #1

WET Data History

Outfall 001									
Date Test Initiated	Acute Results LC_{50} % (% survival in 100% effluent)				Chronic Results IC_{25} %				Footnotes or Comments
	C. dubia	Fathead minnow	Pass or Fail?	Used in RP?	*C. dubia*	Fathead Minnow	Pass or Fail?	Use in RP?	
10/25/2005	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
07/25/2006	>100	>100	Pass	Yes	**40.96**	>100	Pass	Yes	
04/24/2007	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
01/22/2008	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
05/19/2009	>100	>100	Pass	No	>100	>100	Pass	No	1
09/18/2013	>100	>100	Pass	Yes	**87.8**	>100	Pass	Yes	
04/18/2017	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
02/27/2018	>100	>100	Pass	Yes	>100	**50.1**	Pass	Yes	
10/22/2019	>100	>100	Pass	Yes	**27.8**	>100	Pass	Yes	
07/14/2020	>100	>100	Pass	Yes	>100	**38.1**	Pass	Yes	

Footnotes:

1. *Tests done by S-F Analytical, July 2008 – March 2011*. The DNR has reason to believe that WET tests completed by SF Analytical Labs from July 2008 through March 31, 2011 were not performed using proper test methods. Therefore, WET data from this lab during this period has been disqualified and was not included in the analysis.

- According to s. NR 106.08, Wis. Adm. Code, WET reasonable potential is determined by multiplying the highest toxicity value that has been measured in the effluent by a safety factor, to predict the likelihood (95% probability) of toxicity occurring in the effluent above the applicable WET limit. The safety factor used in the equation changes based on the number of toxicity detects in the dataset. The fewer detects present, the higher the safety factor, because there is more uncertainty surrounding the predicted value. **WET limits must be given, according to s. NR 106.08(6), Wis. Adm. Code, whenever the applicable Reasonable Potential equation results in a value greater than 1.0.**

  Acute Reasonable Potential = [(TUa effluent) (B)(AMZ)]
  Chronic Reasonable Potential = [(TUc effluent) (B)(IWC)]

  According to s. NR 106.08(6)(d), Wis. Adm. Code, TUa and TUc effluent values are equal to zero whenever toxicity is not detected (i.e. when the LC_{50}, IC_{25} or $IC_{50} \geq 100\%$).

  Acute Reasonable Potential = 0 < 1.0, reasonable potential is not shown, and a limit is not required.

  Chronic Reasonable Potential = [(TUc effluent) (B)(IWC)]

TUc (maximum) $100/IC_{25}$	**B** (multiplication factor from s. NR 106.08(5)(c), Wis. Adm. Code, Table 4)	IWC
100/27.8 = 3.60	2.3 Based on 5 detects	23%

[(TUc effluent) (B)(IWC)] = 1.9 > 1.0

Therefore, reasonable potential is shown for chronic WET limits using the procedures in s. NR 106.08(6) and representative data from 2005 to 2020.

Expression of WET limits

Chronic WET limit = [100/23] TU_c = 4.3 TU_c expressed as a monthly average at Outfall 001

The WET Checklist was developed to help DNR staff make recommendations regarding WET limits, monitoring, and other related permit conditions. The Checklist indicates whether acute and chronic WET limits are needed, based on requirements specified in s. NR 106.08, Wis. Adm. Code. The Checklist steps the user through a series of questions, assesses points based on the potential for effluent toxicity, and suggests monitoring frequencies based on points accumulated during the Checklist analysis. As toxicity potential increases, more points accumulate, and more monitoring is recommended to ensure that toxicity is not occurring. A summary of the WET Checklist analysis completed for this permittee is shown in the table below. Staff recommendations based on best professional judgment are provided below the summary table. For guidance related to reasonable potential and the WET Checklist, see Chapter 1.3 of the WET Guidance Document: http://dnr.wi.gov/topic/wastewater/WETguidance.html.

WET Checklist Summary

Outfall 001		
	Acute	**Chronic**
AMZ/IWC	Not Applicable. **0 Points**	IWC = 23%. **0 Points**
Historical Data	0 detect tests used to calculate RP. No tests failed. **0 Points**	5 detect tests used to calculate RP. No tests failed. **0 Points**
Effluent Variability	Minor violations and inconsistencies in operations **5 Points**	Same as Acute. **5 Points**
Receiving Water Classification	WWSF **5 Points**	Same as Acute. **5 Points**
Chemical-Specific Data	Limits for zero substances based on ATC; Cu, Pb, Hg, Zn, and chloride detected. (3 pts) Additional Compounds of Concern: Phenol, Mg, and Ba (2 pts) **5 Points**	Limits for zero substances based on CTC; Cu, Pb, Hg, Zn, and chloride detected. (3 pts) Additional Compounds of Concern: Phenol and Ba (2 pts) **5 Points**
Additives	Zero Biocides and 9 Water Quality Conditioners added. (9 pts.) P treatment chemical other than Ferric Chloride (FeCl), Ferrous Sulfate ($FeSO_4$), or alum used: No **9 Points**	All additives used more than once per 4 days. **9 Points**
Discharge Category	Pulp and Paper **15 Points**	Same as Acute. **15 Points**
Wastewater Treatment	Secondary Treatment **0 Points**	Same as Acute. **0 Points**
Downstream Impacts	No impacts known **0 Points**	Same as Acute. **0 Points**

Outfall 001		
	Acute	**Chronic**
Total Checklist Points:	**39 Points**	**39 Points**
Recommended Monitoring Frequency (from Checklist):	1x yearly	1x yearly
Limit Required?	No	Limit = 4.3 TU_c
TRE Recommended? (from Checklist)	No	No

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2019) and other information described above, **annual acute and annual chronic WET tests are recommended in the reissued permit at Outfall 001**. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).

- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, a chronic WET limit is required. The chronic WET limit shall be expressed as **4.3 TUc as a monthly average for Outfall 001** in the effluent limits table of the permit.

- A minimum of annual acute and chronic monitoring is required because a chronic WET limit is required and because this is a primary industrial discharge. Federal regulations in 40 CFR Part 122.44(i) require that monitoring occur at least once per year when a limit is present.

Outfall 004		
	Acute	**Chronic**
AMZ/IWC	Not Applicable. **0 Points**	IWC = 36%. **10 Points**
Historical Data	No test results available from the last 5 years **5 Points**	No test results available from the last 5 years **5 Points**
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations **0 Points**	Same as Acute. **0 Points**
Receiving Water Classification	WWSF **5 Points**	Same as Acute. **5 Points**
Chemical-Specific Data	No limits based on ATC; Cd, Cu, and Chloride detected. (3 pts) Additional Compounds of Concern: none **3 Points**	No limits based on CTC; Cd, Cu, and Chloride detected. (3 pts) Additional Compounds of Concern: none **3 Points**
Additives	1 Biocide (3 pts.) and 1 Water Quality Conditioner added. (1 pt.) P treatment chemical other than Ferric Chloride (FeCl), Ferrous Sulfate ($FeSO_4$), or alum used: No **4 Points**	All additives used more than once per 4 days. **4 Points**
Discharge Category	NCCW **0 Points**	Same as Acute. **0 Points**

Attachment #1

Outfall 004		
	Acute	**Chronic**
Wastewater Treatment	NCCW **0 Points**	Same as Acute. **0 Points**
Downstream Impacts	No impacts known **0 Points**	Same as Acute. **0 Points**
Total Checklist Points:	**17 Points**	**27 Points**
Recommended Monitoring Frequency (from Checklist):	2 tests during permit term (year 2, 4, 6, etc.)	3 tests during permit term (year 1, 3, 5, etc.)
Limit Required?	No	No
TRE Recommended? (from Checklist)	No	No

The checklist point totals correspond to 2 acute WET tests and 3 chronic WET tests in the reissued permit. The discharge from Outfall 004 is non-contact cooling water with untreated river intake water. No toxics were detected at levels which would require limits and only chlorine and dechlorination additives are used. After consideration of the guidance provided in the Department's WET Program Guidance Document (2019), **no WET testing is recommended Outfall 004** because the potential for effluent toxicity is believed to be very low.

PART 7 – EXPRESSION OF LIMITS

Revisions to chs. NR 106 and 205, Wis. Adm. Code align Wisconsin's water quality-based effluent limits with 40 CFR 122.45(d), which requires WPDES permits contain the following concentration limits, whenever practicable and necessary to protect water quality:

- Weekly average and monthly average limitations for continuous discharges subject to ch. NR 210.
- Daily maximum and monthly average limitations for all other discharges.

The Mosinee Plant is an industrial discharge and is therefore subject to daily maximum and monthly average limitations whenever limitations are determined to be necessary.

This evaluation provides additional limitations necessary to comply with the expression of limits in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Code. Pollutants already compliant with these rules or that have an approved impracticability demonstration, are excluded from this evaluation including water-quality based effluent limitations for phosphorus, temperature, and pH, among other parameters. Mass limitations are not subject to the limit expression requirements if concentrations limits are given.

Method for calculation:
The methods for calculating limitations for industrial discharges to conform to 40 CFR 122.45(d) are specified in s. NR 106.07(4), Wis. Adm. Code, as follows:

1. Whenever a daily maximum limitation is determined necessary to protect water quality, a monthly average limitation shall also be included in the permit and set equal to the daily maximum limit unless a more restrictive limit is already determined necessary to protect water quality.
2. Whenever a weekly average limitation is determined necessary to protect water quality:

- A monthly average limitation shall also be included in the permit and set equal to the weekly average limit unless a more restrictive limit is already determined necessary to protect water quality.
- A daily maximum limitation shall also be included in the permit and set equal to the daily maximum WQBEL calculated under s. NR 106.06 or a daily maximum limitation calculated using the following procedure, whichever is more restrictive:

Daily Maximum Limitation= WQBELc × DMF

Where:

DMF = Daily Multiplication Factor as defined in Table 2

CV = coefficient of variation (CV) as calculated in s. NR 106.07(5m)

s. NR 106.07 (4) (e). Table 2 — Daily Multiplication Factor

CV	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
DMF	1.114	1.235	1.359	1.460	1.557	1.639	1.712	1.764	1.802	1.828

CV	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
DMF	1.842	1.849	1.851	1.843	1.830	1.815	1.801	1.781	1.751	1.744

Summary of Additional Limitations:

In conclusion, the following additional limitations in bold are required to comply with ss. NR 106.07 and NR 205.065(7) Expression of Limits.

	Parameter	Daily Maximum	Weekly Average	Monthly Average	Multiplication Factor (CV)	Multiplier (DMF)
Outfall 001	Copper	25 µg/L	21 µg/L	**21 µg/L**		
	Copper-Dissolved Based Limit	36 µg/L	31 µg/L	**31 µg/L**		
Outfall 004	Chlorine	38 µg/L		**38 µg/L**		
Outfall 007	Copper	17 µg/L		**17 µg/L**		
	Copper-Dissolved Based Limit	24 µg/L		**24 µg/L**		

PART 8 – ADDITIVE REVIEW

Unlike the metals and toxic substances evaluated in Part 2, most additives have not undergone the amount of toxicity testing needed to calculate water quality criteria. Instead, in cases where the minimum data requirements necessary to calculate a WQC are not met, a secondary value can be used to regulate the substance, according to s. NR 105.05, Wis. Adm. Code. Whenever an additive is discharged directly into a surface water without receiving treatment or an additive is used in the treatment process and is not expected to be removed before discharge, a review of the additive is needed. Secondary values should be derived according to s. NR 105.05, Wis. Adm. Code. Guidance related to conducting an additive review can be found in *Water Quality Review Procedures for Additives* (2019) http://dnr.wi.gov/topic/wastewater/Guidance.html.

Attachment #1

The following additives may be present in the discharge from Outfall 001. The estimated discharge concentrations are calculated based on the additive usage rate and the annual average flow rate from Outfall 001 without considering any removal of the additive by the treatment system.

Additive Name	Manufacturer	Purpose of Additive including where added	Estimated Effluent Concentration (mg/L)	SAV[1] (mg/L)	SCV[1] (mg/L)	Limit based on SCV (mg/L)
Aqua Ammonia	Interstate Chemical Company	Nutrient for bacteria in UNOX system	13.44	-	-	
Caustic Soda[2]	Interstate Chemical Company	pH control	9.86	-	-	
Cat-Floc 8108 Plus	Nalco	Coagulant for sludge, pH stabilization and TSS decreaser	0.75	0.134	0.0074	0.056
Nalco 7507 Plus	Nalco	Defoamer for clarifiers	0.12	125	111	841
Ferric Sulfate[2]	Nalco	Absorbent of H2S gas	1.08	-	-	
Impact 3225	Aurora Specialty Chemistries	Polymer	3.34	3.13	0.174	1.32
Liquid Alum[2]	Chemtrade Logistics Inc.		7.14	-	-	
Liquid Oxygen	Air Liquide USA LLC	Back-up supply of oxygen for bacteria in UNOX system	324.37	-	-	
Nalcolyte 8105	Nalco	Polymer	Unknown	0.0475	0.0114	0.087
Nalco 9913	Nalco	Coagulant for sludge and TSS decreaser	2.80	0.6	0.0333	0.253

1. Calculated based on toxicity data provided
2. Evaluation are not necessary for additives that have active ingredients consisting only of chlorine, caustic soda (sodium hydroxide), hypochlorite, sulfuric acid, hydrochloric acid, alum, and ferric sulfate.

A secondary value is not needed for aqua ammonia, since the presence of this substance would be regulated through ammonia limits if necessary.

The estimated effluent concentration of Nalco 7507 Plus is lower than the calculated limits based on the SAV and SCV for protection of aquatic life. Therefore, this additive is approved at the current usage rate.

The listed estimated effluent concentrations for Cat-Floc 8108 Plus, Impact 3225, and Nalco 9913 exceed the calculated limits. However, each of these products are polymers and coagulants which are designed to be removed with the solids. Only trace amounts of these products are expected to be present in the discharge. Since more than 90% of these products are expected to be removed prior to discharge, these products are approved at the current usage rates.

Nalcolyte 8105 is a trial product the facility is considering and the usage rate is not yet known. If this product is used at the facility, it may be discharged at up to 0.0475 mg/L.

Attachment #1

Evaluation of Dissolved-Based Metal Limits

Dissolved-based copper limits may included in the permit in place of total recoverable copper limits for the Mosinee Plant pursuant to chs. NR 105 and 106, Wis. Adm. Code.

Information required for the calculation of dissolved-based limits includes the conversion factors from ss. NR 105.05 (5) (for acute criteria) or NR 105.06 (8) (for chronic criteria), Wis. Adm. Code. Background data is also required to translate the dissolved criteria into a site-specific number (the "translator") from which a total recoverable limit may be calculated based on the fraction of the discharged metal which would be dissolved in the receiving water. To perform this translation the following background data is required:

$$\text{Translator} = \frac{M_{tr}}{M_d}$$

Where:

M_d: Dissolved metals concentration in the receiving water (µg/L)
M_{Tr}: Total Recoverable metals concentration in the receiving water (µg/L)

The permit required instream total recoverable and dissolved copper monitoring to calculate a site-specific translator is shown in the table below. Unfortunately, most of the results were non-detect and cannot be used to calculate a translator. The detected dissolved results were higher than the corresponding total recoverable results. This may be the result of contamination issues. Low-level metals sampling procedures are recommended in the reissued permit to avoid contamination issues. It's also recommended the permittee work with a lab with analytical methods capable of achieving a limit of detection close to 0.1 µg/L.

Date	Total Recoverable Copper (µg/L)	Dissolved Copper (µg/L)	Translator
06/21/2016	<4.0	<4.1	
11/08/2016	1.4	1.6	
06/26/2017	1.8	20	
09/05/2017	<1.3	<1.3	
04/09/2018	<1.6	<1.6	
08/06/2018	<1.6	<1.0	
10/04/2018	<1.6	<1.0	
04/15/2019	<1.6	<1.6	
10/16/2019	<1.6	<1.6	

Use of data from nearby basins may be considered per s. NR 106.06(4)(e)1, Wis. Adm. Code. Since a site-specific translator cannot be calculated, the translator is based on the total recoverable and dissolved copper concentration data from a downstream site (Wisconsin River at Plover).

Wisconsin River at Plover	Total Recoverable Copper (∝γ/Λ)	Dissolved Copper (∝γ/Λ)	Translator
	1.338	0.906	1.477

Multiplying the applicable criterion by the translator and the conversion factor from ch. NR 105, Wis.

Adm. Code will give an indication of the amount of "relief" potentially available to the recommended permit limits if the dissolved fraction is considered from the available data:

Outfall 001: Acute Criteria

Translated Criteria = NR 105 Criterion * Conversion Factor * Translator
Copper = 12.7 µg/L* 0.960 * 1.477 = 18 µg/L

Effluent limits calculated based on the translated criteria are as follows:
Daily Maximum Limit = 2 × ATC = 36 µg/L

The 1-day P_{99} of copper at Outfall 001 is 73 µg/L, which exceeds the dissolved-based daily maximum limit. Therefore, there is reasonable potential and the **daily max dissolved-based limit of 36 µg/L** is required in the reissued permit. **A daily max mass limit of 4.0 lbs/day** is also required, calculated based on the max daily flow rate of 13.34 MGD.

Outfall 001: Chronic Criteria

Translated Criteria = NR 105 Criterion * Conversion Factor * Translator
Copper = 5.62 µg/L* 0.960 * 1.477 = 7.97 µg/L

Effluent limits calculated based on the translated criteria are as follows:

$$\text{Weekly Average Limit} = \frac{Q_{mix} * WQC - Q_S * C_S}{Q_E}$$

where: C_S = Background total ammonia concentration
WQC = Translated water quality criteria
Q_S= Allowable dilution (25% of the 7Q10)
Q_E = Effluent flow
$Q_{mix} = Q_S + Q_E$

Weekly Average Dissolved-Based Limit = 31 µg/L

The 4-day P_{99} of copper at Outfall 007 is 41 µg/L, which exceeds the dissolved-based weekly average limit. Therefore, there is reasonable potential, and the **weekly average dissolved-based limit of 31 µg/L** is required in the reissued permit. **A weekly average mass limit of 2.8 lbs/day** is also required, calculated based on the max annual average flow rate of 10.76 MGD.

Outfall 007: Acute Criteria

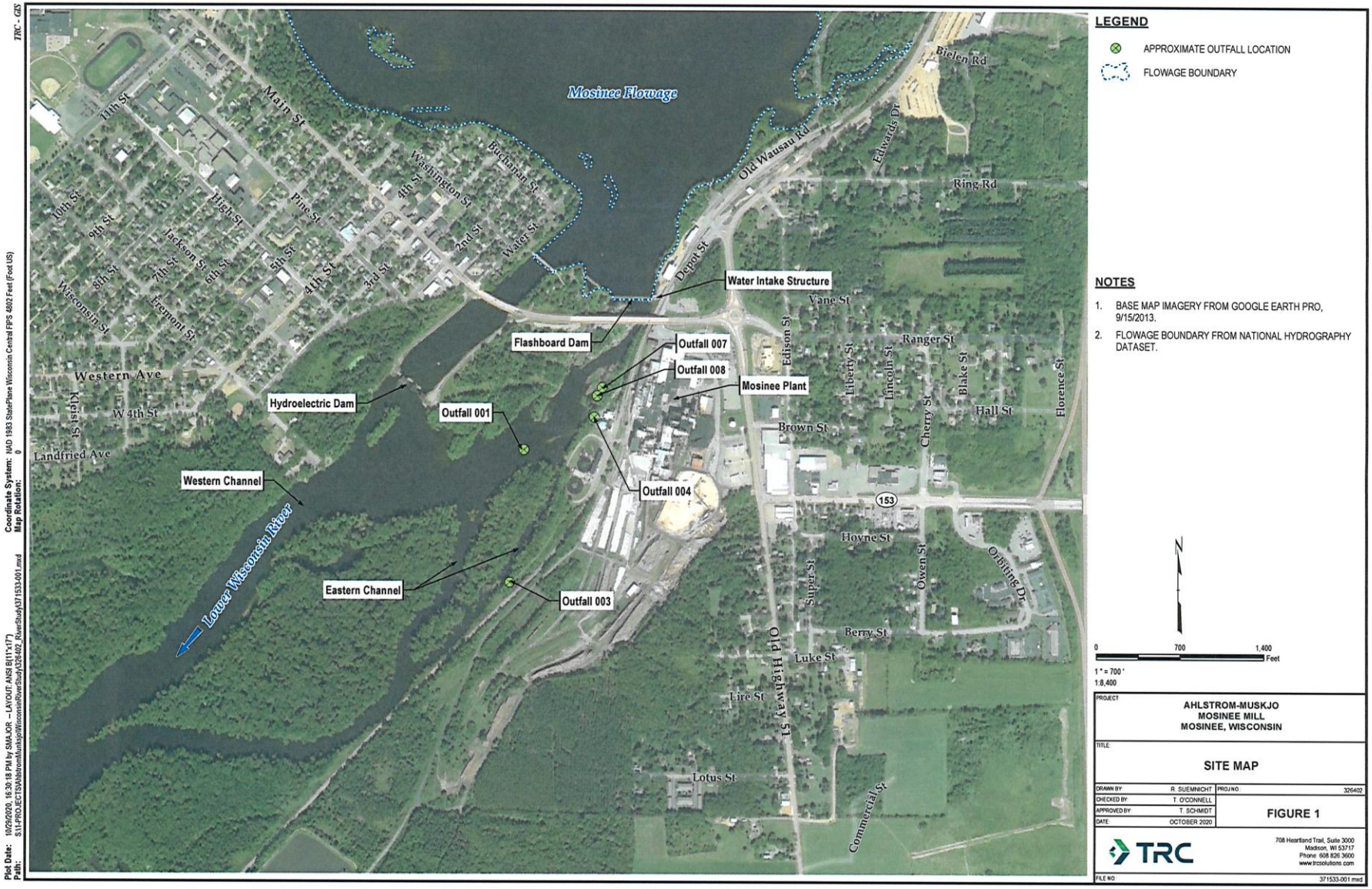
Translated Criteria = NR 105 Criterion * Conversion Factor * Translator
Copper = 8.60 µg/L* 0.960 * 1.477 = 12.2 µg/L

Effluent limits calculated based on the translated criteria are as follows:
Daily Maximum Limit = 2 × ATC = 24.4 µg/L

The 1-day P_{99} of copper at Outfall 007 is 41 µg/L, which exceeds the dissolved-based daily maximum limit. Therefore, there is reasonable potential and the **daily max dissolved-based limit of 24 µg/L** is required in the reissued permit. **A daily max mass limit of 0.015 lbs/day** is also required, calculated based on the daily max flow rate of 0.072 MGD.

The permittee can collect on-site information to support either the estimated dissolved-based criteria or some alternate criteria. The following monitoring is recommended for copper at or near the Mosinee Plant outfall:

- At least four rounds of monitoring of total suspended solids and both total recoverable and filterable metals (copper) in the receiving water would be needed. This information would be used to further verify a site-specific translator for each metal. The monitoring (grab sampling) should take place at a point downstream that is representative of mixed receiving water and effluent, where chemical equilibrium has been reached and use low-level metals monitoring procedures.


Mosinee Flowage
Water Intake Structure
Flashboard Dam
Outfall 007
Outfall 008
Mosinee Plant
Hydroelectric Dam
Outfall 001
Western Channel
Outfall 004
Eastern Channel
Outfall 003
Lower Wisconsin River
Main St
Pine St
High St
Jackson St
Fremont St
Wisconsin St
Western Ave
W 4th St
Kipp St
Landfried Ave
Washington St
Buchanan St
Water St
Depot St
Old Wausau Rd
Edwards Dr
Bielen Rd
Ring Rd
Vane St
Edison St
Liberty St
Lincoln St
Ranger St
Blake St
Florence St
Cherry St
Hall St
Brown St
Hoyne St
Super St
Owen St
Orbiting Dr
Berry St
Luke St
Lire St
Lotus St
Old Highway 51
Commercial St
153
LEGEND
APPROXIMATE OUTFALL LOCATION
FLOWAGE BOUNDARY
NOTES
1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 9/15/2013.
2. FLOWAGE BOUNDARY FROM NATIONAL HYDROGRAPHY DATASET.
0 700 1,400 Feet
1 " = 700 '
1:8,400
PROJECT
AHLSTROM-MUSKJO
MOSINEE MILL
MOSINEE, WISCONSIN
TITLE:
SITE MAP
DRAWN BY: R. SUEMNICHT
CHECKED BY: T. O'CONNELL
APPROVED BY: T. SCHMIDT
DATE: OCTOBER 2020
PROJ NO: 326402
FIGURE 1
TRC
708 Heartland Trail, Suite 3000
Madison, WI 53717
Phone 608 826 3600
www.trcsolutions.com
FILE NO: 371533-001.mxd
Plot Date: 10/29/2020, 16:30:18 PM by SMLAOR – LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Ahlstrom\Munksjo\Wisconsin\RiverStudy\326402_RiverStudy\371533-001.mxd
Coordinate System: NAD 1983 StatePlane Wisconsin Central FIPS 4802 Feet (Feet US)
Map Rotation: 0
TRC - GIS

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

						Temp Dates	Flow Dates
Facility:	AM-Mosinee		**7-Q_{10}:**	220.00	cfs		
Outfall(s):	001		**Dilution:**	65%		**Start:**	05/01/17	05/01/17
Date Prepared:	05/24/2022		**f:**	0		**End:**	04/30/22	04/30/22
Design Flow (Qe):	10.76	MGD	**Stream type:**	Upper Wisconsin River			
Storm Sewer Dist.	0	ft	**Qs:Qe ratio:**	8.6	:1		
			Calculation Needed?	YES			

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs)	Representative Highest Effluent Flow Rate (Qe)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Qesl)	Daily Maximum Flow Rate (Qea)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(cfs)	(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)
JAN	33	49	76	220.00	11.392	11.735	0	94	96	NA	120
FEB	33	50	76	220.00	11.171	11.892	0	93	96	NA	120
MAR	35	52	76	220.00	11.443	11.834	0	96	98	NA	120
APR	44	55	78	220.00	11.400	12.220	0	102	103	NA	120
MAY	60	65	82	220.00	11.386	11.998	0	105	109	106	120
JUN	70	75	85	220.00	11.957	12.800	0	107	109	114	120
JUL	75	80	86	220.00	12.310	13.339	0	107	108	118	120
AUG	73	79	85	220.00	12.057	12.500	0	106	108	NA	120
SEP	65	72	84	220.00	11.971	12.600	0	103	104	NA	120
OCT	51	61	80	220.00	11.714	12.100	0	102	103	NA	120
NOV	39	50	77	220.00	11.629	12.300	0	97	100	NA	120
DEC	33	49	76	220.00	12.211	12.723	0	93	96	NA	120

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

						Temp Dates	Flow Dates
Facility:	AM-Mosinee		**7-Q_{10}:**	220.00	cfs		
Outfall(s):	003 and 004 combined		**Dilution:**	100%		**Start:**	05/01/17	05/01/17
Date Prepared:	05/24/2022		**f:**	0		**End:**	04/30/22	04/30/22
Design Flow (Qe):	16.66	MGD	**Stream type:**	Upper Wisconsin River			
Storm Sewer Dist.	0	ft	**Qs:Qe ratio:**	8.5	:1		
			Calculation Needed?	YES			

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs)	Representative Highest Effluent Flow Rate (Qe)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Qesl)	Daily Maximum Flow Rate (Qea)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(cfs)	(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)
JAN	33	49	76	220.00	16.414	16.900	0	55	63	NA	120
FEB	33	50	76	220.00	16.343	17.000	0	56	77	NA	120
MAR	35	52	76	220.00	16.557	17.000	0	57	75	NA	120
APR	44	55	78	220.00	33.400	59.000	0	69	71	102	120
MAY	60	65	82	220.00	17.943	19.900	0	103	117	105	120
JUN	70	75	85	220.00	21.071	22.300	0	107	112	109	120
JUL	75	80	86	220.00	18.914	19.900	0	112	115	118	120
AUG	73	79	85	220.00	21.100	21.700	0	102	109	119	120
SEP	65	72	84	220.00	21.271	21.600	0	98	105	119	120
OCT	51	61	80	220.00	20.386	21.400	0	84	92	NA	120
NOV	39	50	77	220.00	18.100	19.100	0	57	68	NA	120
DEC	33	49	76	220.00	17.571	18.300	0	53	79	NA	120

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

						Temp Dates	Flow Dates
Facility:	AM-Mosinee		**7-Q_{10}:**	220.00	cfs		
Outfall(s):	007		**Dilution:**	25%		**Start:**	12/01/15	07/11/17
Date Prepared:	05/24/2022		**f:**	0		**End:**	01/17/22	01/17/22
Design Flow (Qe):	0.072	MGD	**Stream type:**	Upper Wisconsin River			
Storm Sewer Dist.	0	ft	**Qs:Qe ratio:**	493.7	:1		
			Calculation Needed?	NO			

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs)	Representative Highest Effluent Flow Rate (Qe)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Qesl)	Daily Maximum Flow Rate (Qea)		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(cfs)	(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)
JAN	33	49	76	220.00	0.072	0.072	0	39	39	NA	120
FEB	33	50	76	220.00	0.072	0.072	0	50	50	NA	120
MAR	35	52	76	220.00	0.072	0.072	0	57	57	NA	120
APR	44	55	78	220.00	0.072	0.072	0	75	75	NA	120
MAY	60	65	82	220.00	0.072	0.072	0	68	68	NA	120
JUN	70	75	85	220.00	0.072	0.072	0	72	72	NA	120
JUL	75	80	86	220.00	0.072	0.072	0	92	92	NA	120
AUG	73	79	85	220.00	0.072	0.072	0	79	79	NA	120
SEP	65	72	84	220.00	0.072	0.072	0	63	63	NA	120
OCT	51	61	80	220.00	0.072	0.072	0	65	65	NA	120
NOV	39	50	77	220.00	0.072	0.072	0	57	57	NA	120
DEC	33	49	76	220.00	0.072	0.072	0	45	45	NA	120