Permit Fact Sheet

General Information

Permit Number	WI-0000825-10-0
Permittee Name and Address	Ahlstrom NA Specialty Solutions LLC 600 Thilmany Road PO Box 600, Kaukauna, WI 54130
Permitted Facility Name and Address	Ahlstrom NA Specialty Solutions LLC 600 Thilmany Road
Permit Term	January 01, 2026 to December 31, 2030
Discharge Location	West Bank of the Lower Fox River, less than 1 mile downstream of the Kaukauna Lock
Receiving Water	Fox River in Fox River/Appleton of Fox River (lower) in Outagamie County
Stream Flow ($Q_{7,10}$)	916 cubic feet per second
Stream Classification	Warm Water Sport Fish (WWSF) community, non-public water supply
Discharge Type	Existing, Continuous

Facility Description

Ahlstrom NA Specialty Solutions LLC's Thilmany Mill manufactures unbleached kraft pulp and specialty kraft paper products such as pressure-sensitive release liner, surgical drape, industrial and food packaging.

Most of the source water for process use and noncontact cooling water use is intake from the Lower Fox River, taken in at an average rate of 29.5 million gallons per day (MGD). The mill treats the intake water for process use with sodium hypochlorite, bromide, alum, and polymer to remove solids and inhibit microbial growth. The mill treats the intake water for noncontact cooling use with sodium hypochlorite to inhibit microbial growth and dechlorinates it with sodium bisulfite. The Thilmany Mill also utilizes an average of 35,000 gal/month of potable water provided by the City of Kaukauna.

From approximately mid-October through mid-May, the cooling water taken from the river is diverted to the water plant intake to conserve energy.

Outfall 001: Wastewaters from pulping operations are pH neutralized and pretreated in a 30-million gallon aerated lagoon (12-day hydraulic retention time) seated upon bedrock (unlined). The 12-foot, 10-acre aerated lagoon is equipped with seven surface aerators. Pulping wastewaters are then pumped from the aerated lagoon to the reactor basin of an oxygen-enriched (UNOX), activated-sludge, secondary treatment system.

Paper mill wastewaters pass through a trash rack and are then pumped to a primary clarifier. Effluent from the primary clarifier is routed to the secondary treatment system's reactor basin where the paper mill wastewaters combine with pulp mill wastewaters from the aerated lagoon. Primary clarifier effluent may also be pumped to a cooling tower prior to being routed to the secondary treatment system's reactor basin.

The secondary treatment system's reactor basin provides approximately 45 minutes of retention time. Phosphorus and nitrogen are added to the reactor basin influent (i.e., primary clarifier effluent) to provide the necessary nutrients for proper biological activity.

Effluent from the secondary treatment system's reactor basin is routed to two secondary clarifiers, which are operated in parallel. Secondary clarifier effluent is discharged to the Lower Fox River via Outfall 001.

Outfall 003: Two noncontact cooling water discharges combine prior to discharge to the Fox River via Outfall 003. The larger flow, which ranges from 15 to 50 MGD, consists of noncontact cooling water from the Number 3 Turbine condenser. The second source is the pulp mill's batch digester secondary condenser blow heat system. Depending on the pulping rate, this second flow occurs for approximately 15 minutes every 45 to 90 minutes. The combined discharge from Outfall 003 occurs for approximately six months of the year, May through October. During cooler months, the combined flow of noncontact cooling water is diverted back to the intake water treatment plant to recover heat. The noncontact cooling water is dechlorinated with sodium bisulfite prior to discharge to the Lower Fox River.

Outfall 012: The aerated lagoon, which holds pulp mill wastewaters, is not sealed. A small portion of the lagoon's contents seeps through the dike that separates the lagoon from the Lower Fox River.

Sample Point Changes: Sample Points 111 and 601 have been rolled into one sample point, 701, as they were both previously used to collect data from the surface water intake structure. Sample Point 015, which represents the combined thermal load from Outfalls 001 and 003, has been removed with this issuance. A mixing zone study submitted in 2018 demonstrated little overlap in temperature between the two outfalls. As a result, the department will treat these outfalls separately when calculating temperature limits and Sample Point 015 is no longer needed.

The previous issuance also included Outfalls 016 and 017 for overflow discharges from the clarifiers #1 and #2 in the intake water treatment plant. 016 has been removed, as Outfall 002, where overflow from clarifier #1 was previously directed to is no longer in use. Overflow from clarifier #1 is now directed to the cooling tower and back to UNOX, activated sludge. 017 has also been removed as there is no regulatory need to monitor overflow at this point. Overflow from this sample point is monitored after combing with noncontact cooling water and prior to discharge at Outfall 003. Neither 016 or 017 have been utilized over the last 25 years.

Industrial Sludge: Primary and secondary sludge is combined and prethickened on a gravity belt thickener and then processed through a screw press. Dewatered solids are taken to the Red Hills Landfill which is owned by the permittee. Since the solids are disposed of at a site licensed pursuant to chs. NR 500 to 538, Wis. Adm. Code, the discharge is exempted from WPDES permit requirements as allowed in s. NR 200.03(3), Wis. Adm. Code. As such, sludge monitoring is not required under this permit.

Sanitary wastes: Sanitary wastes and landfill leachates are sent to Heart of the Valley MSD.

Substantial Compliance Determination

Enforcement During Last Permit: The facility has completed all previously required actions as part of the enforcement process.

After a desktop review of all discharge monitoring reports, land app reports, compliance schedule items, and a site visit on April 11, 2024, this facility has been found to be in substantial compliance with their current permit.

Compliance determination made by Barti Oumarou on April 29, 2024.

Sample Point Descriptions

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
701	33.4 MGD, Data previously recorded under Sample Point 111, January 2020- December 2025	SURFACE WATER INTAKE: Includes a bar screen, an elliptical pipe between the intake and the water treatment plant and travelling screens and intake pumps at the water treatment plan. The surface water intake structure withdraws water from the Lower Fox River and is located on the north bank of the Lower Fox River approximately 465 feet downriver from the Kaukauna City Hydro-electric Plant at latitude 44° 16' 47.1" and longitude 88° 15' 13.5".
001	17.2 MGD, January 2020- December 2025	EFFLUENT: At Sampling Point 001, secondary treatment plant effluent shall be monitored prior to discharge to the Lower Fox River via Outfall 001. Sampling Point 001 consists of a Parshall flume east of the secondary clarifiers and a 24-hr flow-proportional composite sampler located in a sample building just up gradient from Outfall 001. Outfall 001 is located just off the northwest bank of the Lower Fox River approximately 3,360 feet downriver from the Kaukauna City Hydro-electric Plant at latitude 44° 17' 4.03" and longitude 88° 14' 43.7". Grab samples shall be collected from the sample building, flow is monitored at the discharge of the secondary clarifier.
003	17.7 MGD, January 2020- December 2025	EFFLUENT: At Sampling Point 003, No. 3 Turbine condenser noncontact cooling water and pulp mill noncontact cooling water shall be monitored after mixing, prior to discharge to the Lower Fox River via Outfall 003. It also receives overflow from clarifier #2 of the intake water treatment plant in cases of emergency. Sampling Point 003 consists of a rectangular weir located west of the intake water treatment plant and a standpipe just up gradient from Outfall 003. Outfall 003 is located on the northwest bank of the Lower Fox River approximately 1,100 feet downriver from the Kaukauna City Hydro-electric Plant at latitude 44° 16' 49.1" and longitude 88° 15' 5.9". Grab samples are collected at outfall 003 prior to discharge.
011	N/A	BOD5 AND PHOSPHORUS COMPLIANCE POINT: Sampling Point 011 represents the combined daily load from Outfalls 001 and 012 to the Lower Fox River of 5-day biochemical oxygen demand (BOD5) and Total Phosphorus. Since daily loads from Outfalls 001 and 012 are combined mathematically, no effluent sampling is required at Sampling Point 011.
012	N/A	LAGOON SEEPAGE: Outfall 012 represents the discharge of seepage from the pulp mill aerated lagoon to the Lower Fox River. The aerated lagoon is located on the northwest bank of the Lower Fox River just upriver from Outfall 001. Flow is assumed to be 0.01 MGD.

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
014	N/A	WLA: Sampling Point 014 represents the application of wasteload allocated water quality related effluent limitations to the combined daily load of 5-day biochemical oxygen demand discharged from Outfalls 001 and 012 as represented by Sampling Point 011. Wasteload allocated water quality related effluent limitations for the combined daily load are effective May through October each year. No effluent sampling is required at Sampling Point 014.
110	N/A	FIELD BLANK: In-plant Sampling Point 110 represents the mercury field blank that accompanies intake, influent and effluent sampling for mercury.

Permit Requirements

1 Influent – Cooling Water Intake Structure – Monitoring

1.1 Sample Point Number: 701- River Water Intake

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

1.1.1 Changes from Previous Permit

Since Sample Points 111 and 601 both collect data from the surface water intake structure, they have been removed from the permit. Parameters previously reported under these sample points will now be reported under Sample Point 701 to align with the numbering structure used for intake sample points across the state.

1.1.2 Explanation of Limits and Monitoring Requirements

Cooling Water Intake Structure (CWIS)- The Department believes that the facility's intake structure conditionally represents BTA for minimizing adverse environmental impact in accordance with the requirements in section 283.31 (6), Wis. Stats. and section 316 (b) of the Clean Water Act. The basis for this determination can be found in the attached Cooling Water Intake Structure Best Technology Available Determination (CWIS BTA) dated March 10, 2025.

Future BTA- BTA determinations made in future permit reissuances will be made in accordance with ch. NR 111, Wis. Adm. Code. In subsequent permit reissuance applications, the permittee shall provide all the information required in ss. NR 111.41(1) through (7) and (13), Wis. Adm. Code.

The permittee shall also include an alternatives analysis report for compliance with the entrainment BTA requirements with the permit application. This alternatives analysis for entrainment BTA shall examine the options for compliance with the entrainment BTA requirement and propose a candidate entrainment BTA to the Department for consideration during its next BTA determination. The analysis must, at least narratively, address and consider the factors listed in s. NR 111.41(13)(a), Wis. Adm. Code, and may consider the factors listed in s. NR 111.41(13)(b), Wis. Adm. Code. 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.

Impingement Monitoring- Impingement monitoring is required because the permittee plans to comply with impingement mortality standards using a system of technologies. Data is required to establish a baseline impingement mortality rate.

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 s. NR 111.15(1)(c), Wis. Adm. Code.

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. Section NR 111.16(4)(a), Wis. Adm. Code, requires the inclusion of this provision in all permits subject to the requirements of 316(b) of the Clean Water Act. 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.

2 Inplant - Monitoring and Limitations

2.1 Sample Point Number: 110- 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	

2.1.1 Changes from Previous Permit:

In-plant limitations and monitoring requirements were evaluated for this permit term and no changes were required for this sample point.

2.1.2 Explanation of Limits and Monitoring Requirements

Mercury Field Blank- Monitoring is included in the permit pursuant to s. NR 106.145, Wis. Adm. Code. Field blanks must meet the requirements under s. NR 106.145(9) and (10), Wis. Adm. Code. The permittee shall collect a mercury field blank for each set of mercury samples (a set of samples may include a combination of influent, effluent or other samples all collected on the same day). Field blanks are required to verify a sample has not been contaminated during collection, transportation or analysis.

3 Surface Water - Monitoring and Limitations

3.1 Sample Point Number: 001- SEC TREATMENT PLANT EFFL

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	Daily	24-Hr Flow Prop Comp	Effective May 1 through October 31.
BOD5, Total		mg/L	5/Week	24-Hr Flow Prop Comp	Effective November 1 through April 30.
BOD5, Total		lbs/day	Daily	Calculated	Effective May 1 through October 31.
BOD5, Total		lbs/day	5/Week	Calculated	Effective November 1 through April 30.
Suspended Solids, Total		mg/L	5/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Daily Max	10,077 lbs/day	5/Week	Calculated	
Suspended Solids, Total	Monthly Avg	4,497 lbs/day	5/Week	Calculated	
Temperature Maximum		deg F	Daily	Continuous	
Phosphorus, Total		mg/L	Weekly	24-Hr Flow Prop Comp	
Mercury, Total Recoverable		ng/L	Quarterly	Grab	See permit for pollutant minimization measures and report submittal.
pH (Minimum)	Daily Min	4.0 su	Daily	Continuous	See Continuous pH Monitoring permit section for additional requirements.
pH (Maximum)	Daily Max	11.0 su	Daily	Continuous	See Continuous pH Monitoring permit section for additional requirements.
pH Exceedances Greater Than 60 Minutes	Monthly Total	0 Number	Daily	Continuous	See Continuous pH Monitoring permit section for additional requirements.
pH Total Exceedance Time Minutes	Monthly Total	446 minutes	Daily	Calculated	See Continuous pH Monitoring permit section for additional requirements.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Halogen, Total Residual as Cl2	Daily Max	38 ug/L	5/Week	24-Hr Flow Prop Comp	Monitoring and limits only required when chlorine or other halogens are used in the wastewater treatment system. See permit sections 3.2.1.7 and 5.3.6.
Halogen, Total Residual as Cl2	Monthly Avg	38 ug/L	5/Week	24-Hr Flow Prop Comp	Monitoring and limits only required when chlorine or other halogens are used in the wastewater treatment system. See permit sections 3.2.1.7 and 5.3.6.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See Whole Effluent Toxicity (WET) Testing permit section.
Chronic WET		TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See Whole Effluent Toxicity (WET) Testing permit section.
PFOS		ng/L	Monthly	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
PFOA		ng/L	Monthly	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.

3.1.1 Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under "Explanation of Limits and Monitoring Requirements" below.

- **pH**- Additional parameters have been added to the monitoring table so they appear in the eDMR for reporting purposes. No changes have been made from the requirements included in the narrative of the previous permit.
- **Total Residual Halogens**- Monitoring has been added at a frequency of 5/week, with Daily Max and Monthly average limits of 38 ug/L when chlorine or other halogens are used in the wastewater treatment system.
- **WET-** Testing frequency has changed from once per year to two times per year.
- **PFOS and PFOA-** Monthly monitoring is included in the permit in accordance with s. NR 106.98(2)(a), Wis. Adm. Code.

3.1.2 Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached water quality-based effluent limits (WQBEL) memo dated June 28, 2023.

Monitoring Frequencies- The Monitoring Frequencies for Individual Wastewater Permits guidance (April 12, 2021) recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility, in order to characterize effluent quality and variability, to detect events of noncompliance, and to ensure consistency in permits issued across the state. Guidance and requirements in administrative code were considered when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term.

Expression of Limits- In accordance with the federal regulation 40 CFR 122.45(d) and s. NR 205.065, Wis. Adm. Code, limits in this permit are to be expressed as daily maximum and monthly average limits whenever practicable.

Total Suspended Solids (TSS)- TMDL-based limit calculations included in the June 28, 2023 WQBEL memo did not include the joint Waste Load Allocation (WLA) for AIM Demolition (WPDES Permit No. WI-0000698, formerly NewPage Wisconsin Systems - Kimberly) and the permittee (formerly Expera Specialty Solutions, LLC) as approved for the permittee on April 17, 2014. Calculations used for TSS limits are include in the attached May 8, 2014 memo titled Technology-Based and TMDL-Based Effluent Limitations for Expera Specialty Solutions, LLC (WPDES Permit #WI-0000825)- Corrected. The updated TSS WLA were included in the previous permit and were effective on December 31, 2023.

Additional calculations for Technology-based Effluent Limitations (TBELs) are included in the attached memo titled Technology-Based Effluent Limitations for the Ahlstrom NA Specialty Solutions LLC, dated March 12, 2025. Calculated TBELs are less stringent than the TMDL-based limits that have been included in the permit, so the TSS TBELs are not included.

Whole Effluent Toxicity (WET)- WET testing is required during the quarters listed in the permit.

3.2 Sample Point Number: 012- AERATED LAGOON SEEPAGE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
BOD5 Dissolved		mg/L	Monthly	Grab	
BOD5 Dissolved		lbs/day	Monthly	Calculated	See permit section 3.2.2.1.
Phosphorus, Total		mg/L	Monthly	Grab	
Phosphorus, Total		lbs/day	Monthly	Calculated	See permit section 3.2.2.2.

3.2.1 Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under "Explanation of Limits and Monitoring Requirements" below.

- **Phosphorus-** The facility reported dissolved phosphorus during the previous term. The permit has been updated to require monitoring for total phosphorus at sample point 012.

3.2.2 Explanation of Limits and Monitoring Requirements

BOD5 and Phosphorus loads from the aerated lagoons are calculated at sample point 012 and added to the loads calculated for Outfall 001 under Sample Point 011 to determine facility compliance with facility WLAs for both parameters.

Because the water quality standard for phosphorus is based on total phosphorus and the facility has been approved for an MDV to give the facility time to comply with final effluent limits, monitoring requirements have been adjusted to total phosphorus. This change will ensure all phosphorus potentially leaching through the lagoon wall is quantified and taken into consideration when the facility is developing optimization and compliance plans.

3.3 Sample Point Number: 011- 001 & 012 COMBINED LOAD

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Calculated	
BOD5, Total	Daily Max	13,632 lbs/day	Daily	Calculated	TBEL. Effective May 1 through October 31.
BOD5, Total	Monthly Avg	6,987 lbs/day	Daily	Calculated	TBEL. Effective May 1 through October 31.
BOD5, Total	Daily Max	13,632 lbs/day	5/Week	Calculated	TBEL. Effective November 1 through April 30.
BOD5, Total	Monthly Avg	6,987 lbs/day	5/Week	Calculated	TBEL. Effective November 1 through April 30.
Phosphorus, Total	Monthly Avg	0.8 mg/L	Weekly	Calculated	This is an interim MDV limit. See the MDV/Phosphorus permit sections and phosphorus schedules.
Phosphorus, Total		lbs/month	Monthly	Calculated	Report the total monthly phosphorus discharged in lbs/month on the last day of the month on the DMR. See Standard Requirements for 'Appropriate Formulas' to calculate the Total Monthly Discharge in lbs/month.
Phosphorus, Total		lbs/yr	Annual	Calculated	Report the sum of the total monthly discharges (for the months that the MDV is in effect) for the calendar year on the Annual report form.

3.3.1 Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under “Explanation of Limits and Monitoring Requirements” below.

Phosphorus MDV- The permittee has applied for a multi-discharger variance (MDV) for phosphorus for this permit term and the application has been approved by the Department. An MDV interim limit of 0.8 mg/L is effective immediately upon reissuance. The permittee is now required to report the total amount of phosphorus discharged in lbs/month and lbs/year. By March 1 of each year the permittee shall make a payment(s) to participating county(s) of $66.62 per pound of phosphorus discharged during the previous year in excess of the target value defined in the permit.

3.3.2 Explanation of Limits and Monitoring Requirements

Detailed discussions of limits and monitoring requirements can be found in the attached water quality-based effluent limits (WQBEL) memo dated June 28, 2023.

BOD- Mass limits are categorical limits based on ch. NR 284, Wis. Adm. Code. Calculations for these limits can be found in the attached memo titled Technology-Based Effluent Limitations for the Ahlstrom NA Specialty Solutions LLC, dated March 12, 2025.

Phosphorus – Phosphorus rules became effective December 1, 2010 per NR 217, Wis. Adm. Code, that required the permittee to comply with water quality based effluent limits (WQBELs) for total phosphorous. The attached limits memo dated June 28, 2023, contains errors in the calculations for phosphorus limits based on the Lower Fox River TMDL. Errors include an assumed sample frequency of 3 times per week, and not taking into account the joint Waste Load Allocation (WLA) for AIM Demolition (WPDES Permit No. WI-0000698, formerly NewPage Wisconsin Systems - Kimberly) and the permittee (formerly Expera Specialty Solutions, LLC) as approved for the permittee on April 17, 2014. Calculations included in the June 28, 2023 memo are corrected below using the joint WLA of 17,624 lbs/yr and a monitoring frequency of once per week.

The following equation shows the calculation of equivalent effluent concentration:

$$\text{TP Equivalent Effluent Concentration} = \text{WLA} \div (365 \text{ days/yr} * \text{Flow Rate} * \text{Conversion Factor})$$

$$= 17{,}624 \text{ lbs/yr} \div (365 \text{ days/yr} * 19.5 \text{ MGD} * 8.34)$$

$$= 0.297 \text{ mg/L}$$

Since this value is less than 0.3, both a six-month average mass limit and a monthly average mass limit are applicable for total phosphorus. A monthly average limit is simply three times the six-month average limit.

$$\text{TP 6-Month Average Permit Limit} = \text{WLA} \div 365 \text{ days/yr} * \text{6-month multiplier}$$

$$= (17{,}624 \text{ lbs/yr} \div 365 \text{ days/yr}) * 1.3 = 62.8 \text{ lbs/day}$$

$$\text{TP Monthly Average Permit Limit} = \text{TP 6-Month Average Permit Limit} * 3$$

$$= 62.8 \text{ lbs/day} * 3 = 188.3 \text{ lbs/day}$$

Based on these calculations, the final phosphorus WQBELs are 188.3 lbs/day monthly average and 62.8 lbs/day six-month average and were to become effective as scheduled unless a variance was granted. For this permit term, the permittee has applied for the Multi-Discharger Variance (MDV) for phosphorus as provided for in s. 283.16, Wis. Stats., and approved by USEPA on September 3, 2025 for a 10-year duration. The permittee qualifies for the MDV because it is an existing source and a major facility upgrade is needed to comply with the applicable phosphorus WQBELs, thereby creating a financial burden. The interim effluent limit for total phosphorus is 0.8 mg/L as an average monthly limit. The limit was derived using DMR data from January 2017 to February 2022.

Conditions of the MDV require the permittee to optimize phosphorus removal throughout the proposed permit term, comply with interim limits and make annual payments to participating county(s) by March 1 of each year based on the pounds of phosphorus discharged during the previous year in excess of the specified target value.

The “price per pound” value is $50.00 adjusted for CPI annually during the first quarter as defined by s. 283.16(8)(a)2, Wis. Stats and takes effect for reissued permits with effective dates starting April 1. This may differ from the “price per

pound" that is public noticed; however, the "price per pound" is set upon reissuance and is applicable for the entire permit term. The participating county(s) uses these payments to implement non-point source phosphorus control strategies at the watershed level.

Calculated Sample Type- Section 3.2.3.1 explains how to combine BOD5 monitoring results from Sampling Points 001 and 012. That is, for each day that total BOD5 is measured at Sampling Point 001, the facility should report the sum of the soluble BOD5 measured at Sampling Point 012 and the total BOD5 measured at Sampling Point 001 for Sampling Point 011 on monthly discharge monitoring reports. Since for a given month soluble BOD5 is measured only once at Sampling Point 012 and total BOD5 is measured at least five times per week at Sampling Point 011, the same soluble BOD5 value is added to each total BOD5 collected during the entire month. For example, on January 7, 2014 the soluble BOD5 at Sampling Point 012 equaled 14 lbs/day. For the first three days of January 2014, total BOD5 at Sampling Point 001 equaled 1,181 1,058 and 908 lbs/day. Then, the BOD5 reported for January 1, 2 and 3 of 2014 at Sampling Point 011 would be 1,195, 1,072 and 922 lbs/day, respectively. A similar calculation would be performed for the remaining days in January when BOD5 monitoring occurred at Sampling Point 001.

Procedures for monitoring and reporting phosphorus values are outlined under permit section 3.2.3.

3.4 Sample Point Number: 014- WLA EFFECTIVE MAY--OCTOBER

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
WLA Previous Day River Flow		cfs	Daily	Gauge Station	Monitoring Only - May 1 through October 31.
WLA Previous 4 Day Avg River Flow		cfs	Daily	Calculated	Monitoring Only - May 1 through October 31.
WLA Previous Day River Temp		deg F	Daily	Measure	Monitoring Only - May 1 through October 31.
WLA BOD5 Value		lbs/day	Daily	See Table	May 1 through October 31. Use the "WLA Previous Day River Temp" and "WLA Previous 4-day Avg River Flow" to look up the "WLA BOD5 Value" (allocation) from Tables 1 - 5 in section 3.2.4.1.
WLA Adjusted Value		lbs/day	Daily	Calculated	May 1 through October 31. Multiply the "WLA BOD5 Value" times 1.20.
WLA BOD5 Discharged	Daily Max - Variable	lbs/day	Daily	Calculated	May 1 through October 31. Enter the daily mass of BOD5 discharged from Outfall 011. Compare to "WLA Adjusted Value" to determine compliance.
WLA 7 Day Sum Of WLA Values		lbs/day	Daily	Calculated	May 1 through October 31. Enter the sum of the "WLA

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					BOD5 Value" for each 7-consecutive-day period.
WLA 7 Day Sum Of BOD5 Discharged	Daily Max - Variable	lbs/day	Daily	Calculated	May 1 through October 31. Enter the sum of the "WLA BOD5 Discharged" for each 7-consecutive-day period. Compare to the "WLA 7 Day Sum of WLA Values" to determine compliance.

3.4.1 Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and no changes were required in this permit section. Sampling requirements and frequencies are the same as the previous permit.

3.4.2 Explanation of Limits and Monitoring Requirements

WLAs for BOD_5- BOD_5 WLAs are derived from Table 1-b of ch. NR 212, Wis. Adm. Code. During wasteload allocation seasons of May through October, the Thilmany Mill must comply with both the daily maximum TBEL at 001 and daily maximum WLA for BOD_5 at sampling point 011.

3.5 Sample Point Number: 003- NONCONTACT COOLING WATER

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
Temperature Maximum	Daily Max	120 deg F	Daily	Continuous	Limit effective April, July, and August.
Halogen, Total Residual as Cl2	Daily Max	38 ug/L	Daily	Grab	See permit sections 3.2.5.2 and 5.3.6.
Halogen, Total Residual as Cl2	Monthly Avg	38 ug/L	Daily	Grab	See permit sections 3.2.5.2 and 5.3.6.
pH (Minimum)	Daily Min	6.0 su	Quarterly	Grab	
pH (Maximum)	Daily Max	9.0 su	Quarterly	Grab	

3.5.1 Changes from Previous Permit

Effluent limitations and monitoring requirements were evaluated for this permit term and the following changes were made from the previous permit. See additional explanation of limits under “Explanation of Limits and Monitoring Requirements” below.

Temperature Maximum- Temperature monitoring was added to Outfall 003 during the previous issuance to better monitor the entire thermal load from Thilmany. Temperature limits previously applied at Sample Point 015 have been moved to Sample Point 003. Weekly average temperature limits have been removed from the permit and daily max limits have been added.

pH- Quarterly monitoring of pH has been added to Outfall 003 with a daily minimum limit of 6.0 su and a daily maximum limit of 9.0 su.

3.5.2 Explanation of Limits and Monitoring Requirements

Temperature Maximum- Explanation of limits can be found in Water Quality-Based Effluent Limitations for Ahlstrom NA Specialty Solutions LLC Thilmany, March 12, 2025.

Total Residual Halogens- Because chlorine and bromine containing additives are used in the noncontact cooling water discharge, effluent limitations are recommended to assure proper chlorine removal. Further explanation for total residual halogens can be found in the WQBEL memo dated June 8, 2023.

pH- Requirements within this permit are consistent with the water quality-based pH range for waters classified for fish and aquatic life pursuant to s. NR 102.04(4)(c), Wis. Adm. Code.

TSS and Oil and Grease- WPDES Permit No. WI-0044938-6, General Permit for Noncontact Cooling Water or Condensate and Boiler Water contains limits for TSS and Oil and Grease. The permit drafter reviewed values reported within the facility's renewal application for TSS and Oil and Grease at Outfall 003 and found effluent monitoring results to be significantly lower than the limits set in the general permit. As such, monitoring for TSS and Oil and Grease are not required at this time.

4 Schedules

4.1 Impingement Technology Performance Optimization Study

The permittee shall notify the department in writing of its compliance or noncompliance with the interim or final requirements of schedules no later than 14 days following each interim date and the final date of compliance, in accordance with s. NR 106.117(3)(f), Wis. Adm. Code.

Required Action	Due Date
Impingement Technology Performance Optimization Study Plan: The permittee shall submit a study plan for the Impingement Technology Performance Optimization Study required in order to comply with the facility's chosen Impingement Mortality Standard specified in s. NR 111.12 (1)(a)(6), Wis. Adm. Code (system of technologies). The study shall be designed to meet all requirements outlined in s. NR 111.41(5)(b), Wis. Adm. Code. If the study does not meet the requirements of code or the department determines that the terms and conditions of this permit need to be updated in order for the facility to comply with impingement mortality standards, the department may modify or revoke and reissue this permit. The study must also contain an analysis of the use of modified traveling screens as an alternative compliance method for Impingement Mortality Standards.	12/31/2026
Commence Impingement Reduction Verification Sampling: The permittee shall commence the study in accordance with the approved study plans by the listed date.	07/01/2027
Optimization Study Progress Report 1: The permittee shall submit a progress report to the department outlining which portions of the study have been completed and data that has been collected thus far.	07/01/2028

Optimization Study Progress Report 2: The permittee shall submit a progress report to the department outlining which portions of the study have been completed and data that has been collected thus far.	07/01/2029
Final Report: The permittee shall submit the final Impingement Technology Performance Optimization Study to the department. The final report shall meet all requirements outlined in s. NR 111.41(5)(b), Wis. Adm. Code.	06/30/2030

4.1.1 Explanation of Schedule

Impingement Technology Performance Optimization study required for approval of CWIS.

4.2 Water Intake Requirements

The permittee shall submit annual certification statements as specified by Section 1.3.4.2, Annual Certification Statement and Report, in accordance with the following schedule.

Required Action	Due Date
Annual Certification Statements and Reports: Submit an annual certification statement and report on the water intake structures. The annual certification shall include a summary of maintenance and operation of water intake structure technologies, a summary of visual or remote inspections conducted, and a summary of any substantial modifications to the operation of any units that will impact cooling water withdrawals or operation of the water intake structure. The first annual certification statement and report is to be submitted by the Due Date.	01/31/2026
Annual Certification Statement #2: Submit a second annual certification statement as defined above.	01/31/2027
Annual Certification Statement #3: Submit a third annual certification statement as defined above.	01/31/2028
Annual Certification Statement #4: Submit a fourth annual certification statement as defined above.	01/31/2029
Annual Certification Statement #5: Submit a fifth annual certification statement as defined above.	01/31/2030
Annual Certification Statements After Expiration: In the event that this permit is not reissued on time, the permittee shall continue to submit annual certification statements each year by the date specified in Section 1.3.3.2.	

4.2.1 Explanation of Schedule

Schedule has been added to assist with tracking of reports required by permit section 1.3.4.2.

4.3 Mercury Pollutant Minimization Summary

Required Action	Due Date
Final Mercury Report: Submit a report summarizing the mercury pollutant minimization measures implemented during the current permit term and the success in maintaining effluent quality at or below the current concentrations. The report shall include an analysis of trends in quarterly and annual average mercury concentrations and total mass discharge of mercury based on mercury sampling and flow data covering the current permit term. The report shall also include an analysis of	06/30/2030

how influent and effluent mercury varies with time and with significant loadings of mercury such as loads from industries or collection system maintenance.	

4.3.1 Explanation of Schedule

The permittee is required to continue the actions in the pollutant minimization plan to maintain effluent quality at or below current levels. This schedule requires a report once prior to permit reissuance documenting the continued measures.

4.4 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. 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.	12/31/2026
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.	12/31/2027

4.4.1 Explanation of Schedule

As stated above, ch. NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. Section 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.

4.5 Phosphorus Schedule – Optimization and Compliance Planning

The permittee is required to optimize performance and undertake compliance planning to control phosphorus discharges per the following schedule.

Required Action	Due Date
Optimization and Compliance Alternatives: The permittee shall implement a phosphorus discharge optimization plan to control phosphorus discharges to the greatest extent practicable. Submit a progress report that summarizes the approach to phosphorus removal at the facility, the resulting concentration and mass loading for the last 12-month period, and any changes that were or are needed to optimize removal of phosphorus by the due date. The permittee shall also evaluate alternative phosphorus compliance options such as water quality trading and adaptive management. The progress report submitted on the date due shall also detail any outreach activities undertaken to evaluate these options, any communications with credit generators, brokers/clearinghouse, and any potential water quality trading or adaptive management projects that may lead to compliance with phosphorus WQBELs. Financial alternatives evaluation: If the permittee intends to seek a renewed variance at the end of this permit term, the permittee may complete a financial evaluation to support ongoing variance eligibility. The report must evaluate financial mechanisms that have the potential to make compliance with phosphorus WQBELs economically feasible.	12/31/2026
Progress Report #2: Submit a progress report per the above for the prior calendar year.	12/31/2027
Progress Report #3: Submit a progress report per the above for the prior calendar year.	12/31/2028
Progress Report #4: Submit a progress report per the above for the prior calendar year.	12/31/2029
Final MDV Optimization and Compliance Alternatives Report: Submit a progress report per the above for the prior calendar year. If water quality trading or adaptive management will be used to comply with phosphorus limitations during the next permit term, submit a draft water quality trading plan, adaptive management plan, or executed clearinghouse credit purchase agreement. The financial alternatives evaluation as described above must be submitted by the date due if the facility chooses to seek renewal of the variance.	06/30/2030

4.5.1 Explanation of Schedule

Per s. 283.16(6)(a), Wis. Stats. the Department may include a requirement that the permittee optimize the performance of a point source in controlling phosphorus discharges, which may be necessary to achieve compliance with applicable effluent limits. This compliance schedule requires the permittee to prepare an optimization plan with a schedule for implementation and submit it for Department approval. The schedule also includes a compliance planning element focused on economically feasible solutions to low-level phosphorus effluent limits such water quality trading or adaptive management. The permittee shall take the steps called for in the optimization plan and submit annual progress reports on optimizing the removal of phosphorus and establishing a water quality trade or adaptive management project. Should the permittee intend to reapply for a subsequent term of variance coverage, a financial alternatives analysis will need to be completed. Minimum report elements are listed in the schedule, and more information can be found in EPA's March 2024 Financial Capabilities Assessment Guidance, Appendix C.

4.6 Phosphorus Payment per Pound to County

The permittee is required to make annual payments for phosphorus reductions to the participating county or counties in accordance with s. 283.16(8), Wis. Stats, and the following schedule. The price per pound will be set at the time of permit reissuance and will apply for the duration of the permit.

Required Action	Due Date
Annual Verification of Phosphorus Payment to County: The permittee shall make a total payment to the participating county or counties approved by the Department by March 1 of each calendar year. The amount due is equal to the following: [(lbs of phosphorus discharged minus the permittee's target value) times ($66.62 per pound)] or $640,000, whichever is less. See the payment calculation steps in the Surface Water section. The permittee shall submit Form 3200-151 to the Department by March 1 of each calendar year indicating total amount remitted to the participating counties to verify that the correct payment was made. The first payment verification form is due by the specified Due Date. Note: The applicable Target Value is the TMDL derived limit value as defined by s. 283.16(1)(h), Wis. Stats. The "per pound" value is $50.00 adjusted for CPI.	03/01/2027
Annual Verification of Payment #2: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2028
Annual Verification of Payment #3: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2029
Annual Verification of Payment #4: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2030
Continued Coverage: If the permittee intends to seek a renewed variance, an application for the MDV (Multi Discharger Variance) shall be submitted as part of the application for permit reissuance in accordance with s. 283.16(4)(b), Wis. Stats.	
Annual Verification of Payment After Permit Expiration: In the event that this permit is not reissued prior to the expiration date, the permittee shall continue to submit Form 3200-151 to the Department indicating total amount remitted to the participating counties by March 1 each year.	

4.6.1 Explanation of Schedule

Subsection 283.16(6)(b), Wis. Stats., requires permittees that have received approval for the multi-discharger variance (MDV) to implement a watershed project that is designed to reduce non-point sources of phosphorus within the HUC 8 watershed in which the permittee is located. The permittee has selected the "Payment to Counties" watershed option described in s. 283.16(8), Wis. Stats. Under this option the permittee shall make annual payment(s) to participating county(s) that are calculated based on the amount of phosphorus actually discharged during a calendar year in pounds per year less the amount of phosphorus that would have been discharged had the permittee discharged phosphorus at a target value of 62.8 lbs/day. The pounds of phosphorus discharged in excess of the target value is multiplied by a per pound phosphorus charge that will equal $66.62 per pound. This schedule requires the permittee to submit Form 3200-151 to the Department indicating the total amount remitted to the participating county(s).

4.7 Biocide Use Certification

Required Action	Due Date
Biocide Use Certification: The certification of nonuse of chlorophenolic-containing biocides must be in the form of a notarized affidavit signed by the authorized representative and must state that chlorophenolic-containing biocides are not in use at the facility.	06/30/2030

4.7.1 Explanation of Schedule

Due to the facility's industrial classification, the facility must certify that chlorophenolic-containing biocides are not in use at the facility. This is pursuant to s. NR 283.12(2), Wis. Adm. Code.

Attachments

Cooling Water Intake Structure Best Technology Available Determination (CWIS BTA), March 10, 2025.

Water Quality-Based Effluent Limitations for Ahlstrom NA Specialty Solutions LLC Thilmany, June 28, 2023.

Water Quality-Based Effluent Limitations for Ahlstrom NA Specialty Solutions LLC Thilmany, March 12, 2025.

Technology-Based and TMDL-Based Effluent Limitations for Expera Specialty Solutions, LLC (WPDES Permit #WI-0000825), Corrected, May 8, 2014.

Technology-Based Effluent Limitations for the Ahlstrom NA Specialty Solutions LLC Thilmany, March 12, 2025

Phosphorous Multi-Discharger Variance Application for Industrial Facilities, June 28, 2021

Multi-Discharger Variance Application Evaluation Checklist, December 5, 2022

Conditional Approval of a Multi-discharger Phosphorus Variance, December 5, 2022

Justification Of Any Waivers From Permit Application Requirements

No waivers requested or granted as part of this permit reissuance.

Prepared By: Amanda Perdzock, Wastewater Specialist **Date:** September 16, 2025

CWIS BTA DETERMINATION

AHLSTROM MUNKSJÖ THILMANY MILL

Executive Summary

Section 316(b) of the Clean Water Act requires that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available (BTA) for minimizing adverse environmental impact. The department has made a Best Technology Available (BTA) determination for one cooling water intake structure (CWIS) utilized by Ahlstrom Munksjö Thilmany Mill (Thilmany) 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 less than or equal to 125 MGD Actual Intake Flow (AIF) and uses greater than 25% for cooling. Thilmany 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 entrainment reduction measures at Thilmany, including variable frequency drive, and flow reductions during winter months, are the best technologies available for minimizing adverse environmental impact related to entrainment performance. At this time, however, the department lacks necessary documentation to make a determination on impingement reductions measures. Approval of existing impingement reduction measures as best technology available for minimizing adverse environmental impact is conditional until the necessary information, as described below, is submitted and reviewed by the department. Review findings may result in the department changing its determination for impingement reductions.

In order for the department to approve a system of technologies as BTA for impingement reduction, an applicant must submit an impingement technology performance optimization study as described in NR 111.41(5)(b). Results of such as study were not submitted by Thilmany with application materials, and so, a schedule to perform such a study has been included in the facility's permit. Approval of the CWIS as BTA for impingement mortality reductions is contingent on the submittal of the described study. The study must also demonstrate that the systems currently utilized by the facility meet the impingement mortality standard of s. NR 111.12(1)(a)6., Wis. Adm. Code, systems of technologies. The department has determined that no additional requirements of s. NR 111.12 are required.

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 s. NR 111.13(2) and (3), Wis. Adm. Code, the department has concluded that the CWIS is 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.

Intake Description:

Actual Intake Flow = 29.5 MGD (2016- 2020)
Maximum Daily Intake Flow = 62.9 (2016- 2020)
Design Intake Flow = 85.68 MGD (Excluding fire water and standby pumps in accordance with S. NR 111.03(9)(a), Wis. Adm. Code)
Source Water: Lower Fox River, Kaukauna, Outagamie County, WI

Thilmany does not currently monitor flow at the CWIS. Combined discharge flows for Outfall 003 (outfall for all non-contact cooling water that is not reused for process use) and Outfall 001 (outfall for contact cooling water, process water, and cooling water reused as process water) are used to approximate the actual intake flows through the CWIS.

S. NR 111.02(2)(c), Wis. Adm. Code specifies that the requirements of ch. NR 111, Wis. Adm. Code apply to those facilities where the percentage of cooling on an actual intake flow basis is greater than or equal to 25%. The percentage of water used exclusively for noncontact cooling purposes at Thilmany is 37.9%. This percentage has been determined by comparing the volume of water discharged from Outfall 003 to the combined total volumes discharged from Outfalls 001 and 003. Per the permit application, 003 has an average discharge flow of 11.2 MGD. The actual percentage of intake water used for cooling purposes at the facility are assumed to be much higher due to reuse of cooling water in the pulp and paper mills, however, flows inside the pulp and paper mill areas and utility areas are not measured so the exact percentage of water used for once through cooling at the facility is unknown. The facility estimates that about 42.7 percent of the intake flow is reused after initial use as non-contact cooling water.

S. NR 111.02(3)(a), Wis. Adm. Code defines a facility as existing if construction commenced on or before January 17, 2002. Since the intake was constructed in 1960, Thilmany is considered an existing facility for the purposes of this rule.

Thilmany operates a CWIS situated on the north bank of northern-most channel of the Lower Fox River that draws water directly from the river. The CWIS provides river water for use in production, cooling, and fire protection at the plant's pulp mill, paper mill and for various utilities throughout the facility. The plant's CWIS operates continuously, year-round to convey water to the facility's pumps, except during planned outages. The CWIS, raw water system, treated water system, and effluent treatment plant systems are shut down for approximately 7 days once every four years, during which time flow through the CWIS is stopped. Planned outages are also scheduled to occur for the #3 Turbine Generator (TG) cooling water system as well as for the pulp mill and its supporting equipment, which reduce the overall intake water demand of the plant. The #3 TG cooling water system outage occurs once per year for five days and once every eight years for three weeks. The pulp mill scheduled outage occurs twice per year and each outage typically lasts four days. Intake flow through the CWIS varies throughout the year, due to seasonal operation of the plant's pumps.

The plant operates four raw water pumps. Two of these operate continuously, including #1 Raw Water Pump and #3 Raw Water Pump. The #4 Raw Water Pump operates with a variable frequency drive (VFD). However, the pump operates the majority of the year and typically close to the rated capacity. #2 Raw Water Pump is a standby pump. Three TG condenser pumps operate to convey cooling water to the plant's No. 3 TG Condenser. #4 TG Condenser Pump operates continuously, whereas operation of #1 TG

Condenser Pump and #3 TG Condenser Pump varies seasonally, with increased operation occurring during the warmer, summer months.

The facility's WTP is served by three treated water (TW) intake pumps that withdraw water from the CWIS. #3 TW Intake Pump operates continuously to supply water to the WTP. #1 TW Intake Pump and #2 TW Intake Pump utilize VFDs and operation of the two pumps varies seasonally. #1 TW Intake Pump operation varies significantly based on ambient air and river water temperatures as well as plant operations, but the pump typically operates close to its capacity from May through October. #2 TW Intake Pump experiences minimal operation throughout the year, with the majority of operations occurring in June through August.

Additional seasonal variations in CWIS intake flow occur as a result of seasonal water reuse at the facility. During the colder months of the year, typically November through April, when river water temperatures are low enough, the plant recycles its non-contact cooling water as intake for the WTP instead of discharging the flow to Outfall 003. During the cold weather months, recirculation of the non-contact cooling water, along with reduced cooling water needs resulting from the cold weather, provides an estimated 18.65 MGD reduction in AIF.

The CWIS consists of a concrete retaining wall that runs along the riverbank, with two faces of the wall angling inland and intersecting to form a cutout into the riverbank. River water flows into the cutout section and into a concrete elliptical intake pipe located in the more downstream inland-angled face. The overall width of the CWIS is 22 feet, and the structure occupies the water column from the base of the retaining wall, at an elevation of 85.8 feet above mean sea level (MSL3), to the top of the retaining wall, at an elevation of 98.5 feet MSL. The invert of the structure and intake pipe is located at an elevation of 87.5 feet MSL. The low water surface elevation in the Fox River at the location of the CWIS is 90.3 feet. A bar rack spans the inland cutout section, protecting the intake pipe from debris. The bar rack is oriented parallel to the riverbank and at an approximate 45-degree angle to the direction of flow into the intake pipe. The bar rack is 14 feet wide, with a 12-foot effective width, and is 6 feet in height. The rack utilizes 0.375-inch wide bars with 3.5-inch clear spacing; the bars are oriented at a 45-degree angle to the bar rack, so that they are aligned with the direction of flow into the intake pipe.

The concrete elliptical intake pipe has a rise of 48 inches and a span of 78 inches and conveys the river water approximately 700 feet via gravity flow to the facility's two traveling water screens. The traveling water screens (TWS) are both Rex Chain Belt Company screens of the same model and are located in the Water Treatment Plant (WTP) Building. The screens employ 8-ft. wide baskets that utilize #14-gauge Washburn & Moen steel wire screen cloth with 0.25-in. square openings. The low water level at the TWS is 89.15 feet MSL. Through screen velocities are shown in Table 1 below.

Table 1- Calculated through screen velocities at Thilmany.

CWIS	Water Depth (ft.)	TSV (fps) at DIF	TSV (fps) at AIF
Bar Rack	2.8	4.37	3.21
Intake Pipe	4*	7.03	5.16
TWSs	5.25	3.12	2.29

*Flow through the intake pipe is gravity-driven, though at DIF and 5-year maximum AIF conditions it was assumed the pipe would be flowing full.

After passing through the TWS, the river water is either conveyed through the raw water system for direct use throughout the facility or directed to the treated water system where it is treated at the facility's WTP before being distributed throughout the facility. The capacity and description of each pump drawing from the CWIS is shown in Table 2.

Table 2- Pump capacities at Thilmany (Pumps highlighted in grey are not included in the DIF).

Distribution Type	Location of Pumps	Pump Description	Rated Capacity per Pump (GPM) [MGD]
Direct Distribution	Building #8B	#1 Raw Water Pump (duty)	6,000 [8.64]
		#2 Raw Water Pump (standby)	6,000 [8.64]
		#3 Raw Water Pump (duty)	6,000 [8.64]
		#1 TG Condenser Pump (duty)	10,000 [14.4]
		#3 TG Condenser Pump (duty)	3,500 [5.04]
		#4 TG Condenser Pump (duty)	10,000 [14.4]
	Building #13	#4 Raw Water Pump (duty - VFD)	6,000 [8.64]
Treated Water	WTP Building	#1 TW Intake Pump (duty - VFD)	6,000 [8.64]
		#2 TW Intake Pump (duty - VFD)	6,000 [8.64]
		#3 TW Intake Pump (duty)	6,000 [8.64]
Fire Water*	Building #13	Electric Fire Pump (emergency)	2,000 [2.88]
		Jockey Pump #1 (emergency)	80 [0.115]
	WTP Building	Diesel Fire Pump (emergency)	2,000 [2.88]
		Jockey Pump #2 (emergency)	80 [0.115]
		Plant DIF (GPM) [MGD]	**59,500 [85.68]**

S. NR 111.41, Wis. Adm. Code Application Materials Submitted

As part of the WPDES Permit Application, Thilmany was required to submit information required under s. NR 111.41(1) through (7). Based on a review of the flow monitoring data submitted to the department with the permit application, Thilmany's average Actual Intake Flow (AIF) for the years of 2016 through 2020 is 29.5 MGD. Because the AIF is less than 125 MGD, the permittee was not required to submit information required under s. NR 111.41(8) through (12).

Thilmany provided the information required under s. NR 111.41(1) through (4), (6) and (7) as part of the report titled "NPDES Renewal Application Requirements for Facilities with Cooling Water Intake Structures" dated June 28, 2021. This report was prepared by AECOM and submitted to the department on June 29, 2021 as part of the WPDES Permit Application for permit renewal. The facility did not submit an Impingement Technology Performance Optimization study as required by s. NR 111.41(5)(b) for facilities choosing to utilize a system of technologies to comply with the best technology available (BTA) requirements for impingement mortality.

In accordance with s. NR 111.11(1)(a), Thilmany is subject to the 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.

Application materials were submitted to the US Fish and Wildlife Service on December 12, 2022. Responses were received by the department December 13, 2024 and taken into consideration when developing this BTA determination.

BTA Standards for Impingement Mortality

In accordance with s. NR 111.12(1)(a), Thilmany 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. Thilmany has chosen to comply with the impingement mortality BTA standards by utilizing a system of technologies. The facility analyzed this compliance option using the current system of measures which includes intake design, seasonal flow reduction during winter, and variable frequency drives (VFDs). The facility did not, however, provide an impingement technology performance optimization study as specified in s. NR111.41(5). As such, additional information must be submitted before the Department can approve this system of technologies as BTA for impingement mortality.

As the basis for the department's determination, the owner or operator of the facility shall demonstrate that the system of technologies has been optimized to minimize impingement mortality of all species except those designated as fragile or nuisance. In addition, the department's decision will be informed by comparing the impingement mortality performance data under s. NR 111.41(5) to a performance standard of no more than 24 percent impingement mortality, including latent mortality and excluding fragile and nuisance species. According to s. NR 111.11(3)(a), after issuance of a final permit establishing the entrainment requirements under s. NR 111.13, the owner or operator of an existing facility shall comply with the impingement mortality and entrainment standards as soon as practicable, based on a schedule of requirements established by the department.

The most recent impingement study at Thilmany intake was conducted in 2010 and 2011. A total of 5,647 impinged fish were collected from seven identified taxa. However, 4,872 of the total fish collected (86%) were identified as “Other” and from August 2010 to March 2011, “Other” specimens were listed as “Mostly Shad”. The seven identified taxa constitute only 14% of the total impingement (Table 4).

Table 3- Relative abundance of fish impinged at Thilmany (April 2010 – March 2011)

	Bluegill/ Sunfish	Perch	Bass	Walleye	Crappie	Catfish	Gar	Other	Totals
Number	370	268	106	4	21	4	2	4,872	5,647
Percent	7 %	5 %	2 %	<1 %	< 1%	<1 %	<1 %	86 %	100 %

The results of the 2010-2011 impingement study submitted by the facility show an average of 2.1 fish impinged per day, when excluding shad as a fragile species, and no federally or state-protected fish or shellfish encountered during the impingement study in 2010-2011 or the entrainment study in 2020. An average of 13.3 shad were collected per day during the impingement study period. The impingement mortality rate from this study is unknown.

Based on this information, the department conditionally approves the CWIS as BTA for impingement mortality with the condition that an impingement technology performance optimization study, as described at NR 111.41(5)(b), is performed, following the system of measures compliance approach for impingement mortality. The site-specific impingement technology performance optimization study must include:

- Documentation that the operation of the system of technologies has been optimized to minimize impingement mortality. This should include identification of parameters that can be varied and optimized and an identification of optimal settings.
- Identification of an impingement mortality rate that represents a "optimized" operation of the system
- A minimum of 2 years of biological data measuring the reduction in impingement mortality achieved by the system
- A description of any sampling or data collection approach used in measuring the rate of impingement, impingement mortality, or flow reductions.
- Documentation on how each system element contributes to the overall system performance. Any element or parameter that is changed while determining the optimal way to operate the system must be tracked and reported.
- An analysis of modified travel screens with fish return as an alternative compliance option.

A schedule has been included within the facility's permit with a timeline for the submittal of the study. Per s. NR 111.03(20), impingement includes those organisms collected or retained on a sieve with maximum distance in the opening of 0.56 inches. Since the modified traveling screens are the first point after withdrawal with a maximum distance less than 0.56 inches, the permit designates this as the point of compliance for impingement mortality monitoring. If the study shows that an alternate method of compliance is necessary to comply with impingement mortality BTA standards, the department may modify the permit to included additional requirements.

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 approval. 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 provided in s. NR 111.41(13), include closed-cycle recirculating systems, fine mesh screens with a mesh size of 2 millimeters or smaller, variable speed pumps (i.e., variable frequency drive pumps), water reuse or alternate sources of cooling water, and any additional technologies identified by the applicant.

Entrainment Characterization Study Synopsis

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. The BTA must reflect the department's determination of the maximum reduction in entrainment warranted after consideration of the relevant factors. Where costs and benefits have been quantified in sufficient rigor, 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.

In order to characterize the numbers and types of organisms entrained by the current CWIS and the current structure's impact on the waterbody (per ss. NR 111.13(2)(a)1. and (3)(a), Wis. Adm. Code), an entrainment characterization study was performed in 2020. Entrainment sampling occurred monthly during the months of April, July, August, and September 2020 and twice per month during May and June 2020. Samples were collected three times per day for each sampling event: day, dusk, and night. Approximately 300 m^3 of water (drawn from within the intake channel at a location just downstream of the river bar racks) was filtered for each subsample, with sampling performed until a total sample volume of 100 m^3 was collected in the ichthyoplankton sampling net.

Entrainment collection data from April 2020 through September 2020 indicates entrainment occurs as early as April and is limited after June. Fish eggs and larvae were primarily found in samples collected in May and June 2020. The vast majority (72%) of entrainable organisms collected occurred during June. Entrainable fish eggs also peaked in June samples. Diversity also peaked in June when nine taxa of fish were collected, followed by May (5 taxa), and July and September (2 taxa). Monthly entrainment during the 2020 sampling is provided in Table 3.

Table 4. Summary of Organisms collected at Thilmany*

Collection Date	Taxon	Common Name	Life Stage	Density (#/100 m^3)	Type
04/29/2020	*Lota lota*	Burbot	YSL	1	Non-game species
05/12/2020	*Lota lota*	Burbot	Preflex	1	Non-game species
	Percidae	Perches/Darters	Preflex	<1	Forage species
05/26/2020	Cyprinidae	Carps/ Minnows	Yolksac	<1	Forage species
	Actinopterygii	Ray-finned fishes	Eggs	1	N/A
	Etheostoma spp.	Darters	Preflex	<1	Forage species
06/10/2020	*Cyprinus carpio*	Common carp	Preflex	2	Non-game species
	Catostomidae	Suckers	Flexion	2	Non-game species
	Cottus cognatus	Slimy sculpin	Flexed	1	Forage species
	Aplodinotus grunniens	Freshwater drum	Yolksac	2	Non-game species
	Actinopterygii	fish eggs	Eggs	6	N/A
06/24/2020	*Aplodinotus grunniens*	Freshwater drum	7-Yolksac/ 7-Preflex/20 Flexed	11	Non-game species
	Cottus cognatus	Slimy sculpin	Flexed	<1	Forage Species
	Etheostoma spp.	Darters	Preflex	<1	Forage species
	Morone sp.	Temperate Basses	Postflexed	<1	Game species
	Actinopterygii	fish eggs	Eggs	<1	N/A
	Neogobius melanostomus	Gobies	Flexed	<1	Forage species
07/21/2020	*Cottus* spp.	Sculpins	1- flexed; 1- Pre-Juvenile	1	Forage species
	Neogobius melanostomus	Gobies	Flexed	<1	Forage species
08/11/2020	*Cottus* spp.	Sculpins	Flexed	11	Forage species
09/10/2020	*Cottus cognatus*	Slimy sculpin	3 yolksac/1 preflex	1	Forage species
	Etheostoma zonale	Banded Darter	Adult	<1	Forage species

*Table Notes:

YSL – Yolk-sac larvae; Larvae that have hatched from an egg with a yolk sac.

Preflex – Preflexion stage; The preflexion stage begins once both hatching and complete absorption of the yolk sac have occurred and ends with the start of notochord flexion.

Flexed/Flexion – Flexion stage; The flexion stage is defined as beginning with the dorsal bending of the notochord tip concurrent with development of the caudal-fin rays and supporting skeletal elements.

Postflexed – Postflexion stage; The postflexion stage begins after the completion of notochord flexion and ends at the onset of metamorphosis (transformation).

Pre-juvenile - The loss of larval characters and the attainment of juvenile/adult characters distinguish the transformation stage.

Raw entrainment data was provided in Appendix E of "NPDES Renewal Application Requirements for Facilities with Cooling Water Intake Structures". Approximately 5 larvae per 100 m3 were collected over the eight sampling events during the 2020 entrainment study. Approximately one fish egg per 100 m3 were also collected. Larvae were collected during all of the eight events in 2020. Peak larval abundance was observed during the June events. One adult fish, a banded darter, was collected because sampling was performed upstream of the traveling screens per the approved work plan. However, the study submitted by the facility did not include this 39-mm long fish in entrainment estimates because it would not have been entrained through the screens. The facility estimated from data collected in 2020 that 99% of the ichthyoplankton in the Fox Rivers bypasses the Thilmany CWIS.

A review of data by the Department's Fishery's Biologist, Angelo Cozzola, in November of 2023, found that the measures proposed are sufficient in the reduction of fish impingement and entrainment. The volume of water stated to pass through the intake is 2% of the river flow and operational modifications to reduce water use would reduce that further. In addition to the recycling of coolant water in the winter months as outlined in the documentation, a similar method of operation should be considered in spring, encompassing the typical fish spawn avoidance period of March 1st-June 15th. The reduction of water use in this period would reduce the probability of fish early life stage mortality in the intake. The evaluation of current impingement/entrainment rates is minimal, though it should be noted that incidental take will occur with the plan as currently outlined. The area of the intake is of relatively low concern for recreational fisheries/economic value, though gamefish and panfish populations do exist in this area.

No federally or state-protected fish or shellfish were identified within the vicinity of the Thilmany intake. Additionally, no federal or state listed species were encountered during fisheries, ichthyoplankton, impingement, or entrainment studies conducted at or near Thilmany.

Current Technologies Utilized

Thilmany currently utilizes VFDs on 3 pumps.

The cooling water system in the pulp mill area is designed to incorporate significant reuse of the non-contact cooling water for process use at the mill and in the utilities area, as well as reuse of evaporator condensate for process use. Most of the cooling water in the paper mill area is used for once-through, contact cooling and is reused for process use at the mill or is discharged to the facility's effluent treatment plant. The facility also implements seasonal reuse of non-contact cooling water. When river temperatures are low enough, typically November through April, non-contact cooling water is discharged to the influent WTP for reuse in the treated water system, rather than being discharged from the facility via Outfall 003 (AMTM 2021c). On average, the non-contact cooling water discharge flow that is reused represents 42.7 percent of the intake flow; reuse of this flow significantly reduces intake water demand.

Most of the cooling flow at the plant is once-through, and no process or grey water is reused for cooling.

Evaluation of Other Candidate Entrainment Control Technologies

The department has evaluated candidate entrainment control technology in order to make the BTA determination and has included summaries/conclusions below.

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

There are two predominant water-based ("wet") cooling tower technologies. Natural draft cooling towers (NDCTs) are the large hyperbolic concrete towers typically associated with power generating stations (particularly nuclear), where the total facility cooling water flow is in the hundreds of millions of gallons per day. NDCTs use these large flows to create differential pressure between the tower interior and exterior, which induces a natural draft of air to enter the tower at the bottom, cross the high volume of sprayed cooling water within the tower, and exhaust at the top the tower as a warm vapor plume. However, power stations that utilize NCDTs are generally located in remote locations where space is not a constraint, which is not the case with the Thilmany facility. In addition to having limited space for building NDCTs, the cooling water flow at Thilmany is much too low to render NDCTs as a viable technology.

The second predominant “wet” cooling tower technology, Mechanical draft cooling towers (MDCT), are applicable for smaller cooling water flows and thus have a much smaller footprint. Use of fans to create the draft of cooling air enable a smaller vertical and horizontal footprint, as well, when compared to NDCTs. MDCTs would be appropriate for cooling water closed cycle recirculation system (CCRS) application at Thilmany and are thus considered in this report.

> 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 system would reduce entrainment 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[1].

> 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.

Operation of cooling towers will create drift and air pollutant emissions. The drift produced by the cooling towers could create environmental, maintenance, and safety issues for the plant and surrounding areas, including fogging and icing in the parking lot and adjacent road along the river. The potential impact of drift and air pollutant emissions at the site is elevated because the most feasible

[1] Environmental Protection Agency, “National Pollutant Discharge Elimination System—Final Regulations To Establish Requirements for Cooling Water Intake Structures at Existing Facilities and Amend Requirements at Phase I Facilities; Final Rule,” *Federal Register* 79, no. 158 (August, 5 2014): 48333.

location for the cooling towers is within close proximity of the plant's property boundary and the plume would discharge at a low elevation.

The amount of drift emissions is directly proportional to cycles of concentration, source water total dissolved solids (TDS) and removal efficiency of the drift eliminators. Drift droplets contain TDS, such as sodium, calcium, chlorides, and sulfates, found in the water flowing through the cooling tower. The drift droplets may also contain organic matter entrained into the towers or growing there. These constituents are emitted along with the other airborne particulates. The larger drift droplets settle out of the cooling towers exhaust air stream and deposit near the cooling towers. The distance, direction and deposition vary depending on climatic variation, plant operations and constituent concentrations.

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.

Land availability is a significant limitation for the facility since it is bounded by the Fox River on most sides. Underground utility conflicts would also have to be evaluated further.

Calculations were completed to identify the required number of cooling tower cells and footprint needed for the DIF based on an in-line cooling tower arrangement. The total number of required cells assumes a water loading of 6 gallons per minute per square foot (gpm/ft2). To accommodate site space limitations, a configuration was chosen that includes one cooling tower block with four in-line 50-foot (ft) x 50-foot cells, which requires an area of approximately 208 ft x 58 ft. There is currently limited land available on the Thilmany property to accommodate a mechanical-draft cooling tower of this size. However, a portion of the existing plant parking lot could be redesigned to accommodate the cooling towers. Additional considerations including the Fox River floodplain, parking lot usage / size requirements, and proximity to the roadway along the river would increase the difficulty of design.

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

As there are no plans to terminate operations, the remaining useful life of the mill is not a consideration in the efficacy of CCRS.

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 is not required to provide Cost Evaluation Study (s. NR 111.41(9)) or Benefits Evaluation (s. NR 111.41(10)) because AIF is less than 125 MGD. However, the facility did acknowledge that, since the existing cooling systems were designed and built as once-through systems, an all-wet cooling system with a mechanical draft cooling tower is assumed to be the most economical option for a closed cycle cooling retrofit. The facility did express concern that a retrofit would require significant capital cost for the cooling tower materials and piping, pumps, earthwork, concrete supply basin, and support equipment and appurtenances, in addition to higher operating costs (including costs for water treatment, which may be required for both contact and non-contact cooling water) and parasitic energy losses. A cost estimate of $20.8 million to $32.2 million was estimated by the facility for closed-cycle cooling retrofits with mechanical draft cooling towers, depending on the difficulty of installation, however, information on benefits and costs is not of sufficient rigor to make a decision.

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

These were discussed and considered in the section titled *Entrainment Characterization Study Synopsis* above.

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

Daily maximum effluent limits have been proposed during the months of July and August for permit issuance 10 using an approved mixing zone of 80% of the receiving waterbody's $Q_{7,10}$. If changes at the facility causes the flow or temperature of effluent to increase significantly, the approved mixing zone will need to be reevaluated. The facility is currently not attaining the temperature limits calculated before applying the mixing zone, and so, temperature outputs must be taken into consideration when proposing changes at the facility.

Cooling towers lead to lower rates of BTU loading to the receiving water and reduces discharge flow, which can reduce mixing. Decreased flows can also lead to higher limits, making it easier for the facility to attain thermal limits. However, the facility has expressed concern with lower thermal efficiency of the heat exchangers and various cooling systems which could result in increased auxiliary power requirements to operate the major cooling tower components as well as less efficient cooling and higher cooling water temperatures compared to the current intake water temperatures. Due to these conflicting factors, additional analysis is needed to determine whether thermal limits could be attained were the facility to utilize cooling towers to meet entrainment needs.

1.8. Summary/Conclusion.

Both a Natural Draft Cooling Tower and a Mechanical Draft Cooling Tower would potentially reduce entrainment due to decreased flows at Thilmany. This technology also has potential to assist the facility in meeting discharge temperature limits. However, the practicality of this technology is limited due to the following factors:

- Increase in particulate emissions including visibility and viewshed concerns
- Increased energy usage

For these reasons, the department has rejected additional natural draft and mechanical draft cooling towers as options for Thilmany.

2. TECHNOLOGY: Fine Mesh Screens- Traveling Screens

Modified-Ristroph traveling water screens (TWS) are a specific type of traveling water screen that are generally outfitted with fish collection buckets, a low pressure (less than 20 psi) fish removal spray, a fish return trough, and a high-pressure (around 80 psi) debris removal spray. The buckets collect organisms that become impinged on the screen and carry them in a tranquil pool until they can be removed with the low-pressure spray and conveyed in the fish return system back to the source waterbody. Fine mesh may be overlaid on the screens to exclude entrainable organisms such as eggs and larvae in addition to impingeable-size fish.

Retrofit of the existing traveling screens with fine mesh traveling water screens may be possible at Thilmany, although the screens are located at the end of the 700 ft concrete elliptical intake pipe and

installation of a fish handling and return system would have to be routed back to the river through the active Plant area. Additionally, the facility currently chlorinates prior to the traveling screens. The chlorination system would have to be relocated or eliminated to minimize impingement mortality.

The facility also expressed concerns with the impacts of TWS on TSV, higher head loss due to lower open areas, and the negative impacts increased suction could have on plant operations.

> 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).

For any entrainment reductions to be seen, a screen with a mesh size of <2.0 mm should be used, as nearly 100% of eggs still pass through a 2.0mm mesh screen.[2] Fine mesh traveling screens alone do not reduce entrainment, since even small organisms (those that fit through a 3/8" mesh) that are impinged on fine mesh are still defined as "entrained" and safe removal of such organisms is required to reduce entrainment. Survival of organisms removed from fine mesh screens is relatively low, so this typically may be a practical option only when combined with safe removal mechanisms or other entrainment reduction options, or as a last resort for entrainment reduction. One study showed that mortality of eggs retained on fine mesh and subsequently removed ranged from 20-30%. Mortality of larvae retained on fine mesh and subsequently removed was typically greater than 80%.3 (Note: these mortality rates may vary depending on species entrained.)

EPA guidelines recommend a 3.0 fps maximum threshold TSV to ensure impingement survival of adult fish when using course mesh traveling screens. Since the existing TSV at Thilmany is already greater than 3.0 fps, the addition of a fine mesh screen would increase the TSV past the recommended threshold, unless intake rates were optimized to lower the TSV.

> 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.

The additional load exerted by the travelling screen motors, spray pumps, and warm water system would not result in significant additional or new emissions. Construction activities during installation of either of these technologies would result in some air pollutant emissions from truck traffic, mobile construction equipment, etc., but these impacts would be temporary and limited in scope.

> 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.

The facility determined there would be enough space to accommodate fine-mesh traveling screens if the chlorination system located in front of the current traveling screens were relocated or eliminated. Mitigation measures to reduce the TSV, such as expanding the CWIS to add additional traveling screens, were not considered feasible by the facility due to space and cost constraints.

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

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[2] "Technical Development Document for the Final Section 316(b) Existing Facilities Rule," 6-47

[3] "Technical Development Document for the Final Section 316(b) Existing Facilities Rule," 6-47

As there are no plans to terminate operations, the remaining useful life of the mill is not a consideration in the efficacy of fine mesh travelling screens.

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.

The permittee is not required to provide Cost Evaluation Study (s. NR 111.41(9)) or Benefits Evaluation (s. NR 111.41(10)) because AIF is less than 125 MGD. Estimated costs for installation of the screens ranges from $2.3 million to $3.5 million and would likely be on the higher end of the range due to the complexity of the fish handling and return system, however, information on benefits and costs is not of sufficient rigor to make a decision.

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

These were discussed and considered in the section titled *Entrainment Characterization Study Synopsis* above.

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

As discussed in 1.7, thermal discharge is a concern at the Thilmany mill. While the travel screens themselves do not produce a thermal discharge, any measures taken to optimize intake rates and meet recommended TSVs would have to take into account potential impacts on thermal discharges.

2.8. Summary/Conclusion

The facility is currently exploring the feasibility of installing fine-mesh traveling screens with a fish return for the purposes of meeting impingement mortality standards. A report which includes the analysis of this technology will be required as part of the facility's permit. While this system may satisfy impingement mortality BTA standards, the survival of organisms removed from fine mesh screens is relatively low, and as such, does not satisfy entrainment BTA standards. As discussed above, a secondary entrainment method would be needed in conjunction with this technology due to high mortality rates Given that fine mesh may only be a practical option when combined with other safe removal mechanisms or entrainment reduction options, the department has rejected fine-mesh traveling screens as an option for entrainment reduction at Thilmany.

3. TECHNOLOGY: Fine Mesh Screens- Static Screens (Intake Relocation and/or Passive Screens)

Static wedge wire screens are a passive intake system that can be used for entrainment control. These screens can achieve consistently high reductions in impingement and significant entrainment reductions when the screen slot size is small enough to exclude egg and larval life stages, the hydraulic zone of influence is small, and when aided by sweeping flow from source water. These screens are designed to have a through-slot velocity of less than 0.5 fps, and the intake hydraulic zone of influence dissipates quickly away from the screen.

Ambient current crossflow, also known as sweeping velocity, is believed to carry most free-floating organisms and debris past the screen and removes organisms that are temporarily in contact with or pinned against the screen. Additionally, wedge wire screen systems are typically installed with cleaning

and de-icing mechanisms, such as airburst systems, and may be constructed with nickel or copper alloys to discourage biofouling.

Facility concerns with narrow-slot wedgewire screens include proposed installation needing to take place within the tailrace of the FERC-licensed Kaukauna Hydroelectric Project. Long-term maintenance and inspection of the screens would be limited due to in-river accessibility and safety issues due to the close proximity to the tailrace and the high velocity of the water in the channel.

The facility also expressed concern over fouling which could reduce flow and subsequently affect operations. Algae blooms in the summer and potential frazil ice in the winter would increase fouling rates, which would increase cleaning operations and/or require thermal protection.

> 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).

Fine mesh cylindrical wedge wire screens can potentially reduce entrainment by physically preventing eggs and larvae from entering the CWIS. For a 1.0-mm fine mesh cylindrical wedgewire screen the estimated reduction of the entrainment of eggs is 95.7% to 97.5% and for shad larvae the reduction is estimated to be between 16.9% and 21.1%. The overall estimated entrainment reduction is 79%.

While fine mesh cylindrical wedge wire screens may reduce entrainment, the eggs and larvae that were previously entrained would most likely become impinged instead. Because of this, a secondary entrainment technology would be needed for static screens. Alternatively, since safe removal of organisms is required in order to reduce entrainment, monitoring of latent mortality may be warranted if the facility decided to utilize the described system as an entrainment control technology.

> 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 additional load exerted by cleaning and de-icing mechanisms would not result in significant additional or new emissions. Construction activities during installation of either of these technologies would result in some air pollutant emissions from truck traffic, mobile construction equipment, etc, but these impacts would be temporary and limited in scope.

> 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.

Wedge wire screens would be installed in the river, disturbing riverine habitat and requiring additional permitting. If the Thilmany intake is located within the current FERC Project Boundary of the Kaukauna Hydroelectric Project Hydroelectric Plant Ahlstrom Munksjö would need to seek permissions from the hydroelectric facility, and perhaps FERC, to install the narrow-slotted wedge wire screens. Vendor-recommended minimum submerged depths for these screens also means that they would likely need to extend further out into the river than the current CWIS. Associated electrical components for the screens would need to be housed onshore between the river and the road where there is limited space available.

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

As there are no plans to terminate operations, the remaining useful life of the mill is not a consideration in the efficacy of fine mesh static screens.

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.

The permittee is not required to provide Cost Evaluation Study (s. NR 111.41(9)) or Benefits Evaluation (s. NR 111.41(10)) because AIF is less than 125 MGD. The narrow-slot wedge wire screens have a total estimated capital cost of $2.5 to $5.0 million for the DIF, however, information on benefits and costs is not of sufficient rigor to make a decision.

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

These were discussed and considered in the section titled *Entrainment Characterization Study Synopsis* above.

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

As discussed in 1.7, thermal discharge is a concern at the Thilmany mill. While the fine mesh screens themselves do not produce a thermal discharge, any measures taken to optimize intake rates and meet recommended TSVs would have to take into account potential impacts on thermal discharges.

3.8. Summary/Conclusion

The use of fine mesh cylindrical wedge-wire screens would likely reduce entrainment by physically excluding eggs and larvae from entering the CWIS. The department has determined that the use of fine mesh screens does not represent BTA for achieving the maximum reduction in entrainment due to organisms that would have been previously entrained being impinged instead.

4. TECHNOLOGY: Water Reuse or Alternate Sources of Cooling Water

Six potential alternative cooling water source categories were investigated by the facility, including municipal drinking water supplies, reclaimed wastewater, groundwater, irrigation drainage water, “produced” water from local industrial activities, and mine water. The USEPA Facility Registry Service: Facility Interests Dataset was reviewed to identify potential water sources within a 5-mile radius of Thilmany. Of the sources within this approximate 5-mile radius of Thilmany, most were listed as ‘Non-Major’ dischargers (i.e., < 1 MGD) or were private businesses with treatment systems, which would provide minimum benefit when compared to the DIF at Thilmany. The closest WTP, the Heart of the Valley Metropolitan Sewage District, has an average annual design flow of 8.5 MGD. This flow is insignificant compared to the 85.68 MGD DIF of Thilmany, and it is already used as water supply to a power-producing facility downstream. Additionally, many of these sources are on the opposite side of the Fox River as Thilmany and extensive infrastructure would be required to convey water to the facility.

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).

Water reuse and alternative sources of cooling water may potentially reduce entrainment by reducing the intake flow from the source water. The entrainment reductions from water reuse or an alternative source of cooling water vary based how much of the cooling water required by the facility can be provided through reuse or an alternative source.

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.

The use of groundwater may introduce naturally-occurring metals into the waste stream. Using another permittee's effluent may also introduce new pollutants or different concentrations of pollutants to the waste stream. Additional electrical loads associated with a treatment system to remove particulates would likely result in increased electrical demand and production, which could increase associated emissions with the generation process.

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.

The amount of land required to build a pipeline between facilities would vary depending on what permittee's effluent was selected.

Land is currently available for potential advanced treatment systems and/or high-capacity wells.

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

As there are no plans to terminate operations, the remaining useful life of the mill is not a consideration in the efficacy of alternative sources of water and water reuse measures.

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.

The permittee is not required to provide Cost Evaluation Study (s. NR 111.41(9)) or Benefits Evaluation (s. NR 111.41(10)) because AIF is less than 125 MGD.

Increased costs for associated with alternative sources of water and water reuse include:

- Land acquisition and ROWs;
- Design, engineering, permitting, and construction of pipelines and pumping stations; and
- Annual operation and maintenance costs of maintaining pipelines and pumping stations.

Information on benefits and costs is not of sufficient rigor to make a decision at this time.

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

These were discussed and considered in the section titled Entrainment Characterization Study Synopsis above.

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

Discharge temperature depends on the amount and temperature of water available for reuse.

4.8 Summary/Conclusion

Water reuse and alternative sources of cooling water may reduce entrainment due to the reduction in the required intake flow. The construction of the infrastructure (i.e., pipelines) to convey the water across the river to the facility, coupled with the possible need for pretreatment of the water before it is used in the cooling system, makes this option impractical. Disadvantages associated with the use of gray water or reclaimed water include the following:

- Considerable land acquisition and right-of-ways (ROWs) required for pipeline;
- Planning and investigation into appropriate pipeline alignment;
- Land development and annual maintenance of pipeline ROW required;
- Unknown and inconsistent water quality (total suspended solids and dissolved solids) may
- impact operations;
- Additional pre-treatment necessary to utilize graywater;
- Water volume may impact operations and would still necessitate river water usage as the nearby sources lack sufficient volume;
- Topography of area may require pumping stations;
- Roadway and stream crossings of pipeline, if required, would increase land disturbance and permitting; and
- Increased operation costs.

Due to the plant's water demand greatly exceeding any potential alternative cooling water sources, reuse and alternative water sources is rejected as a potential entrainment technology.

5. TECHNOLOGY: Aquatic Filter Barrier (AFB)

An aquatic filter barrier (AFB) is a semipermeable curtain that spans from the waterbody floor to surface and typically surrounds an intake structure in a semi-circular arc. It is permeable to water but retains ichthyoplankton, effectively reducing entrainment and impingement. Typical AFBs are a fabric with a pore size of 0.15mm, but some AFBs also have small perforations (0.5-2.0mm) in order to allow flow[4]. Most AFB systems have a two-layer fabric and employ an air burst system between fabric layers that cleans off any impinged organisms with one to three cleaning cycles (125 psi for 10 seconds). Headloss from AFB systems varies depending on debris blockage but is typically around 0-0.2 feet (0.1 ft headloss at 75% blockage, 0.2 ft headloss at 90% blockage)[5]. AFBs typically operate with a flow-through velocity of 0.007-0.01fps (3-5gpm/sq ft), although those with pores can operate under higher flow-through velocities[6].

The use of AFB to reduce entrainment was deemed infeasible by Thilmany due to the characteristics of the river in the location of the CWIS. The CWIS is located downstream of the Kaukauna City Hydroelectric Plant, which generates turbulence in the River. This, paired with the significant length of the barrier that would be required to span the Fox River in this location, means that the application of the technology would not be an effective means of entrainment reduction. The facility also cited high

[4] "Technical Development Document for the Final Section 316(b) Phase II Existing Facilities Rule," *U.S. Environmental Protection Agency* (February 12, 2004): 1-97.
[5] *Laboratory Evaluations of an Aquatic Filter Barrier (AFB) for Protecting Early Life Stages of Fish,* EPRI, Palo Alto, CA: 2002. 1005534.
[6] "Technical Development Document for the Final Section 316(b) Phase II Existing Facilities Rule," 1-97

level of maintenance and debris concern when rejecting this technology as a viable option for their facility.

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).

AFBs can be deployed seasonally during the primary period of reproduction, allowing them to be removed during winter to prevent ice damage.

The reduction of entrainment by AFBs is dependent upon the size of the perforations in the AFB and the width of eggs and larvae present in the waterbody. AFBs with no perforations effectively exclude all entrainable organisms. A study suggests that AFBs with 0.5mm perforations typically exclude on the order of 90-100% of eggs and larvae (under a flow-through velocity of 0.2 fps), unless species with smaller egg and larval stages, such as the rainbow smelt, striped bass, etc. are present. Entrainment is generally higher for AFBs with larger perforation sizes or higher flow-through velocities[7].

Short-term retention of eggs or larvae on an AFB does not appear to significantly affect mortality rates. Tears in the AFB may increase entrainment, so regular monitoring during AFB deployment is essential.

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.

There is no expected effect on particulate emissions or other pollutants associated with AFB.

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.

AFBs function best when located along the axis of a river because the ambient current of the river effectively carries away backwashed organisms. Backwashing of faces of the AFB that are positioned perpendicular to the river's flow is not especially effective. This is because these areas are surrounded by either stagnant water or eddies, allowing the backwashed material to be re-impinged. This can affect the design flow-through velocity and required size of the AFB.

AFBs can impact the navigability of waterways, as they extend out into the waterbody. Large AFBs may be infeasible for this reason.

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

As there are no plans to terminate operations, the remaining useful life of the mill is not a consideration in the efficacy of

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.

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[7] *Laboratory Evaluations of an Aquatic Filter Barrier (AFB) for Protecting Early Life Stages of Fish,* EPRI, Palo Alto, CA: 2002. 1005534.

For a non-perforated AFB, held in place by a floating boom and anchor points, operating with a flow-through velocity of 0.007-0.01 fps, and employing an air burst system, EPA projects the following costs (in 2002 dollars):

Capital Costs for Aquatic Filter Barrier Provided by Vendor

	Floating Boom		
Flow	Capital Cost (2002 Dollars)		
gpm	Low	High	Average
10,000	$545,000	$980,900	$762,900
104,000	$1,961,800	$2,724,800	$2,343,300
347,000	$6,212,500	$8,501,300	$7,356,900

Estimated AFB Annual O&M Costs

Flow	O&M	O&M	O&M
gpm	Low	High	Average
10,000	$109,000	$327,000	$218,000
104,000	$163,500	$327,000	$245,200
347,000	$545,000	$762,900	$653,900

however, information on benefits and costs is not of sufficient rigor to make a decision.

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

These were discussed and considered in the section titled Entrainment Performance Evaluation above. AFBs isolate and restrict the function of a portion of the local habitat/ecosystem. However, they also reduce entrainment and impingement, providing a benefit to the local ecosystem. This is a tradeoff that must be evaluated by the regional fisheries management biologist. One option is to use an AFB with perforations to decrease the required surface area of the AFB, while allowing some additional amount of entrainment.

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

There is no expected effect on thermal loads associated with AFB.

5.8. Summary/Conclusion.

Due to river velocities and the impact on river navigability at the intake site, AFB has been rejected as a viable technology for entrainment mortality reduction at Thilmany.

Entrainment BTA Decision

Natural Draft and Mechanical Draft Cooling Towers were rejected as options for Thilmany due to increases in particulate emissions and energy usage. A 2mm or finer screen option was ruled out by the Department because safe removal of organisms impinged on fine mesh is required to reduce entrainment and survival of organisms removed from fine mesh screens is relatively low.

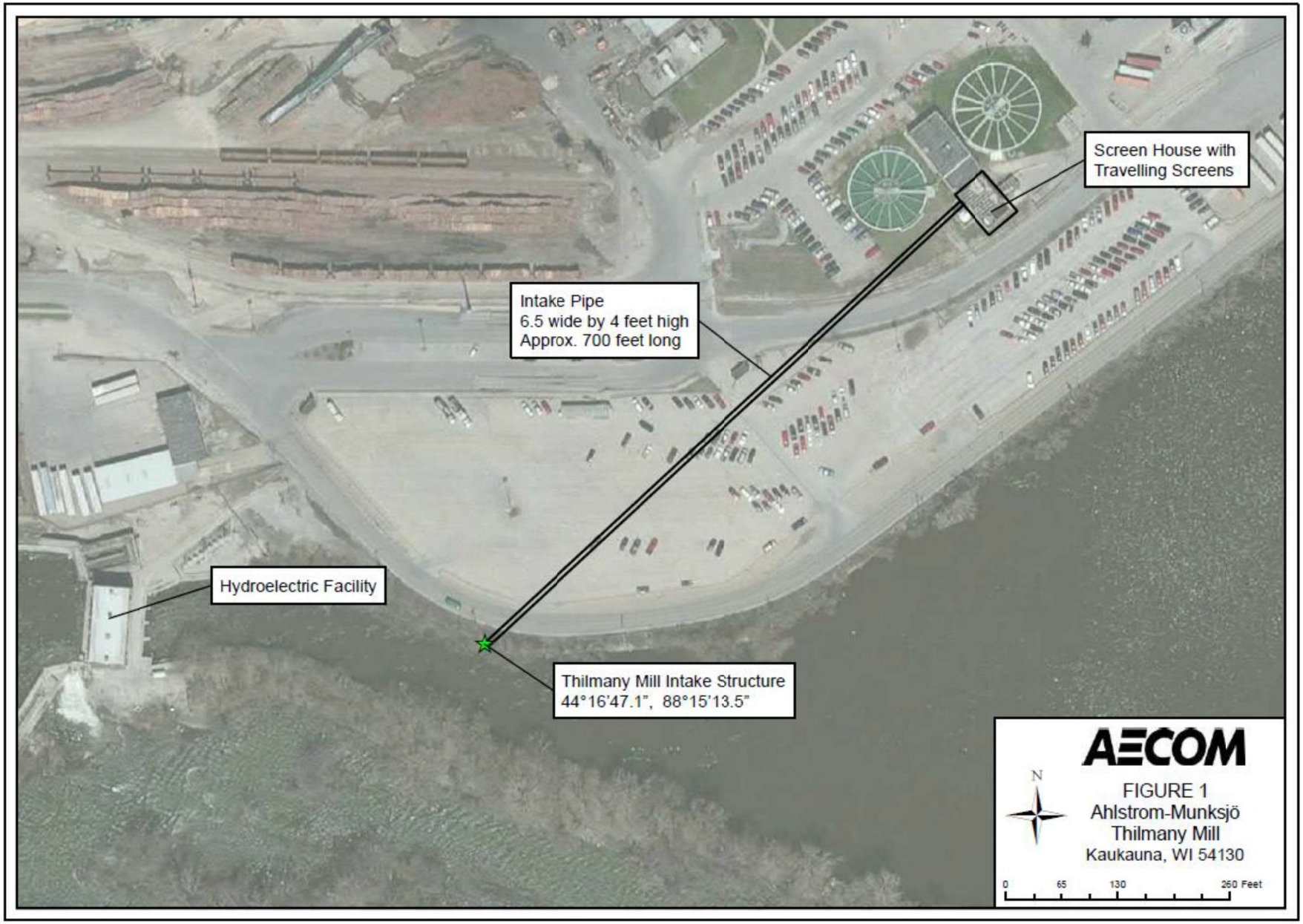
Reducing intake rates through the use of alternative water sources such as municipal drinking water, reclaimed wastewater, groundwater, irrigation drainage water, grey water from local industrial activities, and mine water was also deemed infeasible due to the low volumes that could be attained from any one alternative source and the high costs of implementing each option.

The Department reviewed available information regarding the location, design, operation, and capacity of the water intake structure. After consideration of the factors specified in s. NR 111.13, the department has concluded that Thilmany's current intake configuration is considered the best technology available to achieve the maximum reduction in entrainment at this time.

Summary

1. The department has made a Best Technology Available (BTA) determination for one cooling water intake structure (CWIS) located at Ahlstrom Munksjö Thilmany Mill (Thilmany) in accordance with ch. NR 111, Wis. Adm. Code. The department has concluded that the existing CWIS is conditionally the best technology available for minimizing adverse environmental impact.
2. The permittee proposes s. NR 111.12(1)(a)6., Wis. Adm. Code, systems of technologies, as the BTA for impingement mortality for its CWIS. The department has evaluated this proposal under ch. NR 111, Wis. Adm. Code, and recommends conditional approval. Conditions of this approval include submittal of impingement technology performance optimization study, to include an analysis of modified travel screens with fish return as an alternative compliance option.
3. After consideration of the factors listed in s. NR 111.13, Wis. Adm. Code, the department has concluded that the existing CWIS is 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 111.40(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).
5. The BTA includes requirements for monitoring and inspection of the CWIS and other requirements and terms; please see the permit for those requirements.

Attachment 1- Aerial View of Thilmany CWIS



CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: June 28, 2023

TO: Amanda Perdzock – WY/3

FROM: Rachel Fritz – WY/3

SUBJECT: Water Quality-Based Effluent Limitations for Ahlstrom NA Specialty Solutions LLC Thilmany WPDES Permit No. WI-0000825-10-0

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 Ahlstrom NA Specialty Solutions LLC Thilmany in Outagamie County. This facility discharges to the Fox River, located in the Fox River/Appleton Watershed in the Lower Fox River Basin. This discharge is included in the Lower Fox 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 – Secondary Treatment Plant Effluent

Parameter	Daily Maximum	Daily Minimum	Monthly Average	Six-month Average	Rolling 12-Month Average	Footnotes
Flow Rate						1
BOD_5						1
TSS						2, 3
Interim limits	21,720 lbs/day		11,316 lbs/day			
Final TMDL limits	9,162 lbs/day		4,089 lbs/day			
pH	9.0 s.u.	6.0 s.u.				1
Mercury						4
Total Residual Halogens	38 ug/L		**38 ug/L**			5, 6
Phosphorus						1
Temperature						1
Acute WET						7, 9
Chronic WET						8, 9

Outfall 003 – Noncontact Cooling Water

Parameter	Daily Maximum	Daily Minimum	Monthly Average	Six-month Average	Rolling 12-Month Average	Footnotes
Flow Rate						1
Temperature						10
Total Residual Halogens	38 ug/L		**38 ug/L**			6

Outfall 011 – 001 & 012 Combined Load

Flow Rate						1
BOD_5	13,632 lbs/day		6,987 lbs/day			2, 11
Phosphorus						3, 12
LCA Interim Limit			1.0 mg/L			
HAC Interim Limit			0.8 mg/L			
Final TMDL limits	115 lbs/day			38 lbs/day		

Footnotes:

1. Monitoring only
2. The BOD mass limits and interim TSS 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.
3. The final mass TSS and phosphorus limits are based on the Total Maximum Daily Load (TMDL) for the Lower Fox River to address phosphorus water quality impairments within the TMDL area. The permit includes a compliance schedule ending on 12/31/2023 to meet the final TMDL limits.
4. The effluent data showed no reasonable potential to exceed the WQBELs for mercury. The permit should include monitoring and a requirement to continue PMP efforts and maintain effluent quality at or below current levels
5. Total halogen limits and monitoring are only required at Outfall 001 when chlorine or other halogens are used in the wastewater treatment system.
6. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
7. After consideration of the guidance provided in the Department's WET Program Guidance Document (2019) and other information described above two acute WET tests per year are recommended in the reissued permit. 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.
8. After consideration of the guidance provided in the Department's WET Program Guidance Document (2019) and other information described above two chronic WET tests per year are recommended in the reissued permit. The Instream Waste Concentration (IWC) to assess chronic test results is 13%. 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% and the dilution water used in WET tests conducted on Outfall 00` shall be a grab sample collected from Lower Fox River.
9. 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).
10. The following temperature limits are required at Outfall 003:

MAY	75	
JUN	88	
JUL	88	102
AUG	87	101

SEP	87	120
OCT	81	

11. In addition to the listed limits, the combined load of Outfalls 001 and 012 is limited in May through October to the wasteload allocation from ch. NR 212 , Wis. Adm. Code listed in tables in the current permit.
12. Under the phosphorus MDV, a level currently achievable (LCA) interim limit of 1.0 mg/L should be effective upon permit reissuance. A compliance schedule may be included in the permit until the highest attainable condition (HAC) limit of 0.8 mg/L can be met. The final WQBELs are the TMDL-based mass limits.

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, Thermal Table & Map

PREPARED BY: _____ Date: _____
Rachel Fritz, PE,
Water Resources Engineer

E-cc: Barti Oumarou, Wastewater Engineer – NER/Oshkosh
Jason Knutson, Wastewater Section Chief – WY/3
Diane Figiel, Water Resources Engineer – WY/3

Attachment #1

Water Quality-Based Effluent Limitations for
Ahlstrom Munksjo NA Specialty Solutions LLC Thilmany

WPDES Permit No. WI-0000825-10-0

Prepared by: Rachel Fritz

PART 1 – BACKGROUND INFORMATION

Facility Description

Ahlstrom Munksjo NA Specialty Solutions LLC in Thilmany manufactures unbleached kraft pulp and specialty kraft paper products such as pressure-sensitive release liner, and industrial and food packaging.

Most of the source water for process use and noncontact cooling water use is intake from the Lower Fox River. The mill treats the intake water for process use with sodium hypochlorite, bromide, alum, and polymer to remove solids and inhibit microbial growth. The mill treats the intake water for noncontact cooling use with sodium hypochlorite to inhibit microbial growth and dechlorinates it with sodium bisulfite. Ahlstrom Munksjo-Thilmany also utilizes a small amount of potable water provided by the City of Kaukauna.

Outfall 001: Wastewaters from pulping operations at Ahlstrom Munksjo-Thilmany are pH neutralized and pretreated in a 30-million gallon aerated lagoon (12-day hydraulic retention time) seated upon bedrock (unlined). The aerated lagoon is equipped with seven surface aerators. Pulping wastewaters are then pumped from the aerated lagoon to the reactor basin of an oxygen-enriched, activated-sludge, secondary treatment system.

Paper mill wastewaters pass through a trash rack and are then pumped to a primary clarifier. Effluent from the primary clarifier is routed to the secondary treatment system's reactor basin where the paper mill wastewaters combine with pulp mill wastewaters from the aerated lagoon. Primary clarifier effluent may also be pumped to a cooling tower prior to being routed to the secondary treatment system's reactor basin. The secondary treatment system's reactor basin provides approximately 45 minutes of retention time. Phosphorus and nitrogen are added to the reactor basin influent (i.e., primary clarifier effluent) to provide the necessary nutrients for proper biological activity.

Effluent from the secondary treatment system's reactor basin is routed to two secondary clarifiers, which are operated in parallel. Secondary clarifier effluent is discharged to the Lower Fox River via Outfall 001.

Outfall 003: Two noncontact cooling water discharges combine prior to discharge to the Fox River via Outfall 003. The larger flow, which ranges from 15 to 50 MGD, consists of noncontact cooling water from the Number 3 Turbine condenser. The second source is the pulp mill's batch digester secondary condenser blow heat system. Depending on the pulping rate, this second flow occurs for approximately 15 minutes every 45 to 90 minutes. The combined discharge from Outfall 003 occurs for approximately six months of the year, May through October. During cooler months the combined flow of noncontact cooling water is diverted back to the intake water treatment plant to recover heat. The noncontact cooling water is dechlorinated with sodium bisulfite prior to discharge to the Lower Fox River.

Outfall 012: The aerated lagoon, which holds pulp mill wastewaters, is not sealed. A small portion of the lagoon's contents seeps through the dike that separates the lagoon from the Lower Fox River.

Outfall 011 represents the combined BOD and phosphorus load from Outfalls 001 and 012. Outfall 015 represents the combined thermal load from Outfalls 001 and 003. The permit also includes Outfalls 016 and 017 for overflow discharges from the clarifiers in the intake water treatment plant. Neither of these outfalls have been utilized over the course of the current permit term.

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

Existing Permit Limitations

The current permit, which expired on December 31, 2021, includes the following effluent limitations and monitoring requirements.

Outfall 001 – Secondary Treatment Plant Effluent

Parameter	Daily Maximum	Daily Minimum	Monthly Average	Six-month Average	Rolling 12-Month Average	Footnotes
Flow Rate						1
BOD_5						1
TSS						3
Current limits	21,720 lbs/day		11,316 lbs/day			
Final TMDL limits	9,162 lbs/day		4,089 lbs/day			
pH	9.0 s.u.	6.0 s.u.				4
Mercury	5.4 ng/L					5
Phosphorus						1
Temperature						1
WET						1, 6

Outfall 003 – Noncontact Cooling Water

Parameter	Daily Maximum	Daily Minimum	Monthly Average	Six-month Average	Rolling 12-Month Average	Footnotes
Flow Rate						1
Temperature						1
Total Residual Halogens	38 ug/L		38 ug/L			

Outfall 011 – 001 & 012 Combined Load

Parameter	Daily Maximum	Daily Minimum	Monthly Average	Six-month Average	Rolling 12-Month Average	Footnotes
Flow Rate						1
BOD_5	13,632 lbs/day		6,987 lbs/day			2
Phosphorus						3
Current limits					1.0 mg/L	
Final TMDL limits	116 lbs/day			39 lbs/day		

Outfall 015 – 001 & 003 Thermal Load

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Six-month Average	Rolling 12-Month Average	Footnotes
Temperature						7
June			89 ºF			
July			89 ºF			
August			93 ºF			
September			92 ºF			
October			94 ºF			

Footnotes:

1. Monitoring only
2. In addition to the listed limits, the combined load of Outfalls 001 and 012 is limited in May through October to the wasteload allocation from ch. NR 212 , Wis. Adm. Code listed in tables in the current permit.
3. The listed current permit limits for TSS and phosphorus are technology based limits. The permit includes a compliance schedule ending on 12/31/2023 to meet the final TMDL limits.
4. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
5. This is an alternative effluent limitation included in the permit as part of the facility's mercury variance.
6. The IWC for chronic WET was 11.6%
7. These temperature limits became effective August 31, 2021. The limits apply to the flow-weighted temperature of the calculated combined discharges from Outfalls 001 and 003.

Receiving Water Information

- Name: Lower Fox River
- Waterbody Identification Code (WBIC): 117900
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply. (Cold Water and Public Water Supply criteria are used for bioaccumulating compounds of concern, because the discharge is within the Great Lakes basin.)
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following low flow and harmonic mean values are from USGS for the Fox River at Wrightstown (Station 04084500) based on data from 1969 to 2013. The annual low flows used in previous evaluations were calculated by USGS in November 2010 so the updated low flows incorporate additional gauge data collected since this date. The gauge station is located 0.4 mi downstream of Outfall 001.

  $7\text{-}Q_{10}$ = 916 cfs (cubic feet per second)
  $7\text{-}Q_2$ = 1340 cfs
  $30\text{-}Q_5$ = 1249 cfs
  Harmonic Mean Flow = 3098 cfs

  Monthly low flows for the Fox River at Wrightstown for May through October are also available calculated by USGS in November 2010. Monthly low flows have been calculated by USGS for all months of the year at another gauge station at the mouth of the Fox River. Low flows at this location

are expected to be comparable to the discharge location and these flows are used for the remainder of the year.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7-Q_{10} (cfs)	2481*	1911*	2087*	1848*	1660	1430	1290	1120	1050	1160	1632*	2231*
7-Q_2 (cfs)					2960	2670	1770	1650	1820	1160		

*Flows are from the mouth of the Fox River.

- Hardness = 178 mg/L as $CaCO_3$. This value represents the geometric mean of data from WET testing from 2017 to 2021.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from the Fox River at DePere (Station ID 53210) is used for this evaluation. Cadmium, copper and chloride data is from 2011 to 2021 and chromium, lead, and zinc data is from 2001 to 2007 since more recent data was unavailable. Mercury background data provided by the permittee is also used in the evaluation. 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: Georgia Pacific-Broadway discharges about 3 mi downstream and there are several other nearby dischargers to the Lower Fox River. Given the amount of dilution available, mixing zones from these dischargers are not expected to overlap. The permittee conducted a mixing zone study in 2018 which demonstrated that the thermal mixing zones from Outfalls 001 and 003 do not overlap. Therefore these discharges are not combined in the limit calculations in this evaluation.
- Impaired water status: The Lower Fox River is 303(d) listed as impaired for phosphorus and PCBs.

Effluent Information

- Flow rates: The max annual average flow rates for Outfalls 001 and 003 are used as the effluent flow rates in this evaluation.

Effluent Flow Statistics (MGD) (January 2017 to February 2022)		
	Outfall 001	Outfall 003
Max annual average	19.46	43.87
Peak daily	27.40	84.10
Peak weekly	22.79	78.30
Peak monthly	21.48	68.20
Average	17.79	35.51

- Hardness = 209 mg/L as $CaCO_3$. This value represents the geometric mean of data from the permit application and WET testing from 2017 to 2021.
- 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 from the Lower Fox River with a negligible amount from the municipal water supply (0.035 MG/month or ~0.004% of the total source water)
- Additives: The discharge from Outfall 001 may contain 3 biocides, 16 water quality conditioners, and 28 process additives. One of theses same biocides, sodium hypochlorite, and the same 16 water quality conditioners may also be present in the seepage discharge from Outfall 012. Sodium

hypochlorite and 5 of the water quality conditioners may be present in the emergency discharges from Outfalls 016 and 017. Sodium hypochlorite, sodium bisulfite, and 5 of the same water quality conditioners used at Outfall 001 are used in the discharge from Outfall 003. These additives are evaluated in detail in a separate memo.

- Effluent characterization: Outfalls 001 and 012 are primary industrial outfalls, 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. Outfall 003 is a noncontact cooling water discharge and the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus ammonia, chloride, hardness and phosphorus. The permit-required monitoring for mercury at Outfall 001 and total halogens at Outfall 003 from January 2017 to February 2022 is also used in this evaluation.
- 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.". Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

	Outfall 001 Mercury (ng/L) Mar 2017 – Nov 2021	Outfall 003 Total Halogens (ug/L) Apr 2017 – Nov 2021
1-day P_{99}	2.86	19
4-day P_{99}	1.78	7.7
30-day P_{99}	1.23	2.7
Mean	0.97	0.61
Std	0.55	8.0
Sample size	20	537
Range	0.415 - 2.57	<10 - 30

Sample Date	Copper µg/L
04/01/2021	<1.9
04/21/2021	2.0
04/27/2021	3.1
04/29/2022	<1.9
Average	2.6

"<" 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.

The following table presents the average concentrations and loadings at Outfall 001 from January 2017 to February 2022 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Outfall 001 Averages of Parameters with Limits

	Average Measurement
BOD_5	1923 lbs/day
TSS	2876 lbs/day
pH field	6.3 s.u.

Attachment #1

Phosphorus	0.46 mg/L
Mercury	0.97 ng/L
Temperature	86 °F

*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)

Daily Maximum Limit Calculation Method

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. In accordance with s. NR 106.06(3)(b), limitations based on acute toxicity are either set equal to two times the acute criteria (the final acute value) or calculated using the mass balance equation below, whichever is more restrictive.

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

Where:

WQC =Acute toxicity criterion or secondary acute value according to ch. NR 105, Wis. Adm. Code.

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.

In this case, limits set equal to two times the acute criteria are more restrictive and this method is used to calculate the daily maximum limits shown in the table below.

The following tables list the calculated WQBELs 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 permit application also includes monitoring data from the aerated treatment lagoon. Outfall 012 covers the seepage from the lagoon into the Fox River. No flow measurement is available for the seepage

but the available effluent data is compared to the limits calculated for Outfall 001 to gauge the need for WQBELs at Outfall 012.

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 733 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			Outfall 012
SUBSTANCE	REF. HARD. mg/L	ATC	MEAN BACK-GRD.	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		-			
Arsenic		340		679.6	135.9	<2.6			2.4
Cadmium	209	24.1	0.0104	24.1	4.8	0.31			2.3
Chromium	209	3303	0.458	3302.9	661	1.0			<5.0
Copper	209	31.2	1.08	31.2	6.2	2.55			<9.5
Lead	209	218	0.718	218.4	43.7	<4.3			<22
Mercury (ng/L)		830	1.51	1657.0			2.86	2.57	<66
Nickel	209	877		876.8	175	<3.5			<18
Zinc	209	230	2.077	229.7	46	10			46
Chloride (mg/L)		757	24.9	1464.2	292.8	44			27
Barium**		3077.3		3077.3	615.5	55			110
Boron**		17625		17625	3525	48			<90
Manganese**		8604		8604	1721	180			350

* 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.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 229 cfs (¼ of the 7-Q_{10}), as specified in s. NR 106.06(4)(c), Wis. Adm. Code

						Outfall 001		Outfall 012
SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}	MEAN EFFL. CONC.
Chlorine		7.28		55.36	11.07	-		
Arsenic		152.2		1157	231.5	<2.6		2.4
Cadmium	175	3.82	0.0104	3.82	0.8	0.31		2.3
Chromium	178	211.41	0.458	211	42.2	1.0		<5.0
Copper	178	16.92	1.08	16.9	3.38	2.55		<9.5
Lead	178	48.77	0.718	48.8	9.8	<4.3		<22
Mercury (ng/L)		440	1.51	440			1.78	<66
Nickel	178	84.83		85	17.0	<3.5		<18
Zinc	178	198.87	2.077	199	39.8	10		46
Chloride (mg/L)		395	24.9	2839	567.8	44		27
Barium**		170.96		1300	260.0	55		110

Attachment #1

						Outfall 001		Outfall 012
SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P_{99}	MEAN EFFL. CONC.
Boron**		979		7444	1488.9	48		<90
Manganese**		4251		32328	6466	180		350

* The indicated hardness may differ from the receiving water hardness because the receiving water hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the chronic criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.
** The limit for this substance is based on a secondary value.
** 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.

Monthly Average Limits based on Wildlife Criteria (WC)

RECEIVING WATER FLOW = 285 cfs (¼ of the 90-Q_{10}), as specified in s. NR 106.06(4), Wis. Adm. Code

					Outfall 001		Outfall 012
SUBSTANCE	WC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}	MEAN EFFL. CONC.
Mercury (ng/L)	1.3	1.51	1.30			1.23	<66
4,4'-DDD	11		11	2.2			0.25

Monthly Average Limits based on Human Threshold Criteria (HTC)

RECEIVING WATER FLOW = 775 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

					Outfall 001		Outfall 012
SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P_{99}	MEAN EFFL. CONC.
Cadmium	370	0.0104	9515	1903.1	0.31		2.3
Chromium (+3)	3818000	0.458	98190424	19638085	1.0		<5.0
Lead	140	0.718	3583	716.5	<4.3		<22
Mercury (ng/L)	1.5	1.51	1.5			1.23	<66
Nickel	43000	0.00	1105864	221173	<3.5		<18
Endosulfan	181		4655	931.0			0.075
Boron*	165800		165800	33160	48		110

* The limit for this substance is based on a secondary value.

Monthly Average Limits based on Human Cancer Criteria (HCC)

RECEIVING WATER FLOW = 775 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06(4), Wis. Adm. Code.

					Outfall 001	Outfall 012
SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	MEAN EFFL. CONC.
Arsenic	13.3	-	342.0	68.41	<2.6	2.4
Chloroform	1960	-	50407	10081	18	

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.

Total Residual Halogens – Because chlorine and bromine containing additives are used in the noncontact cooling water discharge, effluent limitations are recommended to assure proper chlorine removal. Specifically, a continued **daily maximum limit of 38 µg/L is required for Outfall 003**. Weekly average limitations are not needed as the daily maximum limitations will provide adequate protection of the resource. However, **a monthly average limit of 38 ug/L** is required to meet the expression of limits requirements in s. NR 106.07(4) , Wis. Adm. Code.

Chlorine and other halogens may also be present in the discharge from Outfall 001 if chlorine is utilized in the treatment system for control of filamentous bacteria. This type of treatment has not occurred at the facility since 2006. If chlorine is used in the wastewater treatment system in the future, chlorine limits should apply during chlorine usage. Specifically, **a daily maximum limit of 38 µg/L and a monthly average limit of 38 µg/L are required at Outfall 001 when chlorine is utilized in the treatment system.**

Mercury – The WQBEL for total recoverable mercury is set equal to the most stringent criterion of 1.3 ng/L, according to s. NR 106.06(6), Wis. Adm. Code, because the background concentration in the receiving water exceeds 1.3 ng/L.

The current permit includes a mercury variance with an alternative effluent limit of 5.4 ng/L. Effluent mercury concentrations have decreased significantly and spikes have been less frequent since 2012. A total of 20 effluent sampling results are available from January 2017 to February 2022 for total recoverable mercury. The average concentration was 0.97 ng/L, and the maximum was 2.57 ng/L. Because the 30-day P_{99} of available data (1.23 ng/L) is less than the most stringent WQBEL of 1.3 ng/L, **no WQBEL for mercury is required for permit reissuance.** The permit should include a requirement to continue PMP efforts and maintain effluent quality at or below current levels.

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 one fifth of the calculated limits to the measured effluent concentration of 180 ug/L at Outfall 001 and 350 ug/L at Outfall 012 show 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

Attachment #1

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 Ahlstrom Munksjo-Thilmany does not currently have ammonia nitrogen limits, the need for limits is evaluated at this time.

Ammonia Nitrogen Effluent Data

Sample Date	Ammonia Nitrogen mg/L	
	Outfall 001	Outfall 012
04/21/2021	0.086	
04/27/2021	0.22	
04/29/2021	1.1	
05/04/2021	0.50	
07/07/2021		2.1
Average	0.48	2.1

Given the amount of dilution available, these effluent levels are well below the lowest ammonia limits that would be calculated. Therefore no limits or additional monitoring are recommended in the reissued permit.

PART 4 – PHOSPHORUS AND TOTAL SUSPENDED SOLIDS

Outfall 003 is comprised of only noncontact cooling water sourced from the receiving water with no contributions of phosphorus. The available phosphorus monitoring data shows effluent concentrations similar to receiving water concentrations. Phosphorus limits are not applicable for this discharge in accordance with s. NR 217.10(2), Wis. Adm. Code.

Technology-Based Effluent 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 rolling average limit of 1.0 mg/L, or an approved alternative concentration limit.

Because Ahlstrom Munksjo-Thilmany currently has a limit of 1.0 mg/L (applied at the combined Outfall 011), this limit should be included in the reissued permit. This limit remains applicable unless a more stringent WQBEL is given.

Water Quality Based Limit – Phosphorus

Revisions to the administrative rules for phosphorus discharges took effect on December 1, 2010. These rule revisions include additions to ch. NR 102 (s. NR 102.05), which establish phosphorus standards for surface waters. Revisions to ch. NR 217 (s. NR 217, Subchapter III) establish procedures for determining water quality based effluent limits for phosphorus, based on the applicable standards in ch. NR 102.

Section NR 217.16, Wis. Adm. Code, states that the Department may include a TMDL-derived water quality based effluent limit (WQBEL) for phosphorus in addition to, or in lieu of, a s. NR 217.13 WQBEL in a WPDES permit. Because the discharge is directly to the Fox River which is an impaired

segment covered under an approved TMDL, the TMDL-based limit is protective of the immediate receiving water as well as downstream waters and can be included in the WPDES permit absent the s. NR 217.13 WQBEL. This limit should be expressed in a manner consistent with the wasteload allocation and assumptions of the TMDL. If after two permit terms, the Department determines the nonpoint source load allocation has not been substantially reduced, the Department may include the s. NR 217.13 WQBEL unless these reductions are likely to occur.

TMDL Limits – Phosphorus

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 (*April 2020) and are based on the annual phosphorus wasteload allocation (WLA) given in pounds per year. This WLA found in the *Total Maximum Daily Loads and Watershed Management Plan for Total Phosphorus and Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay (LFR TMDL)* report dated March 2012 are expressed as maximum annual loads (lbs/year).

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 WLAs would not be consistent with the assumptions and requirements of the TMDL. Therefore, limits given to facilities included in the Lower Fox River TMDL are given monthly average mass limits and, if the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits. The following equation shows the calculation of equivalent effluent concentration:

$$\begin{aligned}\text{TP Equivalent Effluent Concentration} &= \text{WLA} \div (365\ \text{days/yr} * \text{Flow Rate} * \text{Conversion Factor}) \\ &= 11{,}976\ \text{lbs/yr} \div (365\ \text{days/yr} * 19.5\ \text{MGD} * 8.34) \\ &= 0.202\ \text{mg/L}\end{aligned}$$

Since this value is less than 0.3, both a six-month average mass limit and a monthly average mass limit are applicable for total phosphorus. A monthly average limit is simply three times the six-month average limit.

$$\begin{aligned}\text{TP 6-Month Average Permit Limit} &= \text{WLA} \div 365\ \text{days/yr} * \text{6-month multiplier} \\ &= (11{,}976\ \text{lbs/yr} \div 365\ \text{days/yr}) * 1.17 \\ &= 38.3\ \text{lbs/day}\end{aligned}$$

$$\begin{aligned}\text{TP Monthly Average Permit Limit} &= \text{TP 6-Month Average Permit Limit} * 3 \\ &= 38.3\ \text{lbs/day} * 3 \\ &= 115\ \text{lbs/day}\end{aligned}$$

The multiplier used in the six-month average calculation was determined according to the implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 0.77. This is the standard deviation divided by the mean of mass data. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by the facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as three times per week; if a different monitoring frequency is used, the stated limits should be reevaluated.

The phosphorus limits above are slightly different than those in the current permit due to a change in monitoring frequency. Phosphorus TMDL limits were previously calculated based on a weekly monitoring frequency.

Effluent Data – Phosphorus
The following table lists the statistics for effluent phosphorus levels from January 2017 through February 2022 for informational purposes.

	Phosphorus Concentration (mg/L)	Phosphorus Mass (lbs/day)
1-day P_{99}	2.40	2209
4-day P_{99}	1.56	1263
30-day P_{99}	1.13	781
Mean	0.93	569
Std	0.44	439
Sample Size	267	267
Range	0.22 - 5	44 - 2952

Multi-Discharge Variance Interim Limit
With the permit application, Ahlstrom-Munksjo Thilmany has applied for the phosphorus multi-discharger variance (MDV). Conditions of the phosphorus MDV require the facility to comply with an interim phosphorus limit in lieu of meeting the final WQBEL for this permit term. The recommended interim limit, pursuant to s. 283.16 (6) 1, Wis. Stats., is **0.8 mg/L as a monthly average**. Comparing the monthly averages of phosphorus concentrations to a limit of 0.8 mg/L, the limit would have been exceeded in 2 months between January 2017 and February 2022 (3% of months). A compliance schedule may be appropriate to meet this interim limit, but compliance with 0.8 mg/L shall be no later than the end of the reissued permit.

The current permit phosphorus limit is 1.0 mg/L. Therefore **1.0 mg/L is considered a level currently achievable (LCA)** for the discharge. A limit of 1.0 mg/L as a monthly average should not be exceeded during the compliance schedule. This limit has been expressed as a 12-month average in the current permit but should be expressed as a monthly average consistent with other dischargers covered under the MDV. The effluent phosphorus data from January 2017 to February 2022 demonstrates that this limit is readily attainable for the discharge (no exceedances of the monthly average during this period).

TMDL Limits – Total Suspended Solids
The Lower Fox River TMDL also has wasteload allocations for total suspended solids (TSS). For an industrial facility the limits for TSS must be expressed as a daily maximum and a monthly average. The TSS limits are calculated by converting the yearly WLA to monthly and daily limits, as described in guidance. The following equations show the TSS limit calculations:

TSS Monthly Average Permit Limit = WLA ÷ 365 days/yr * monthly multiplier
= (1,122,241 lbs/yr ÷ 365 days/yr) * 1.33
= 4,089 lbs/day

TSS Daily Maximum Permit Limit = WLA ÷ 365 days/yr * daily multiplier
= (1,122,241 lbs/yr ÷ 365 days/yr) * 2.98

= 9,162 lbs/day

The multiplier used in the weekly average and monthly average calculation was determined according to implementation guidance. A coefficient of variation was calculated, based on TSS mass monitoring data, to be 0.57. This is the standard deviation divided by the mean of mass data. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies TSS monitoring as five times per week; if a different monitoring frequency is used, the stated limits should be reevaluated.

Limits based on a WLA should be given in a permit regardless of reasonable potential. However, for informational purposes, the following table lists the statistics for TSS discharge as mass, using data from January 2017 to February 2022.

	TSS (lbs/day)
1-day P_{99}	8610
4-day P_{99}	5310
30-day P_{99}	3645
Mean	2879
Std	1645
Sample Size	1883
Range	0 – 21,197

The data demonstrates that the TMDL limits are not readily attainable for the discharge. The current TSS limits should be continued as interim limits in the reissued permit until the end of the compliance schedule on 12/31/2023.

Conclusions

The following is a summary of limits recommended by this evaluation. All limits should apply to the combined discharge of Outfalls 001 and 012 at the calculated combined discharge designated as Outfall 011.

Interim Limits

- Level currently achievable: Total phosphorus 1.0 mg/L as a monthly average
- Highest attainable condition: Total phosphorus 0.8 mg/L as a monthly average
- Daily max TSS limit of 21,720 lbs/day
- Monthly average TSS limit of 11,316 lbs/day

Final WQBELs

- Monthly average Total Phosphorus mass limit of 115 lbs/day
- 6-month average Total Phosphorus mass limit of 38 lbs/day
- Monthly average TSS mass limit of 4,089 lbs/day
- Daily maximum TSS mass limit of 9,162 lbs/day
- Once the final TMDL mass limits take effect, any effective concentration limits at that time will be retained in the permit.

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.

The facility provided a 2018 mixing zone study which demonstrated that the thermal plumes from Outfalls 001 and 003 are unlikely to overlap. Therefore, temperature limits are calculated for each outfall as separate discharges.

Due to the amount of upstream flow available for dilution at Outfall 001 in the limit calculation (Qs:Qe >20:1), the lowest calculated limitation is 120° F (s. NR 106.55(6)(a), Wis. Adm. Code). Less dilution is available for Outfall 003 and some of the calculated limits are less than 120° F. 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 January 2017 to February 2022.

The table below summarizes the maximum temperatures reported during monitoring from January 2017 to February 2022.

Monthly Temperature Effluent Data & Limits
Outfall 001

				Daily Maximum Effluent Limitation (°F)
JAN	86	88	NA	120
FEB	86	90	NA	120
MAR	90	91	NA	120
APR	93	95	116	120
MAY	93	96	103	120
JUN	94	96	109	120
JUL	94	98	119	120
AUG	95	97	110	120
SEP	92	94	106	120
OCT	91	94	NA	120
NOV	90	94	NA	120
DEC	85	88	NA	120

Outfall 003

Attachment #1

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	-	-	-	-
FEB	-	-	-	-
MAR	-	-	-	-
APR	80	98	94	120
MAY	98	102	**75**	120
JUN	105	110	**88**	114
JUL	108	112	**88**	**102**
AUG	106	110	**87**	**101**
SEP	118	122	**87**	**120**
OCT	98	101	**81**	120
NOV	89	106	115	120
DEC	-	-	-	-

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

Comparing the representative highest effluent temperature to the calculated effluent limits determines the reasonable potential of exceeding the effluent limits. The months in which limitations are recommended are shown in bold. Based on this analysis**, at Outfall 003 daily maximum temperature limits are needed for the months of July through September and weekly average temperature maximum limits are necessary for the months of May through October**.

For Outfall 001, no effluent limits are recommended for temperature based on the available effluent data. The complete thermal tables used for the limit calculation is attached. **Temperature monitoring is recommended in the reissued permit for both outfalls at the same frequency as required by the current permit.**

The following general options are available for a facility to explore potential relief from the temperature limits:

- Effluent monitoring data: Verification or additional effluent monitoring (flow and/or temperature) may be appropriate if there were questions on the representativeness of the current effluent data.
- Monthly low receiving water flows: Contract with USGS to generate updated monthly low flow estimates for the receiving water to be used in place of the annual low flow. Since no flow data has been collected at the nearby stream gauge since 2013, monthly low flows are unlikely to change unless additional gauge data is collected.
- Mixing zone studies: A demonstration of rapid and complete mixing may allow for the use of a mixing zone other than the default 25%.
- Collection of site-specific ambient temperature: default background temperatures for streams in Wisconsin, so actual data from the direct receiving water may provide for relaxed thermal limits but only if the site-specific temperatures are lower than the small stream defaults used in the above tables
- A variance to the water quality standard: This is typically considered to be the least preferable and most complex option as it requires the evaluation of the other alternatives.

These options are explained in additional detail in the August 15, 2013 Department *Guidance for Implementation of Wisconsin's Thermal Water Quality Standards*
http://dnr.wi.gov/topic/surfacewater/documents/ThermalGuidance2edition8152013.pdf

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 *Whole Effluent Toxicity (WET) Program Guidance Document (October 29, 2019).*

Outfall 003 is comprised primarily of noncontact cooling water and the discharge only occurs between April and November. The discharge does not have a history of WET failures and no toxic compounds other than chlorine, which is limited in the permit, are expected at levels of concern. Since there is believed to be a very low risk of toxicity, WET testing for is not recommended during the reissued permit term. Outfall 012 is seepage to the river from the aerated treatment lagoon. The same additives which may be present in this discharge are also present in the discharge from Outfall 001 and any toxicity present in the Outfall 012 is expected to be captured in the WET testing of Outfall 001.

- 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 for chronic WET was 11.6% during the last permit term. The IWC of 13% shown in the WET Checklist summary below was 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 = 19.5 MGD = 30.1 cfs
f = fraction of the Q_e withdrawn from the receiving water = 1
Q_s = ¼ of the 7-Q_{10} = 916 cfs ÷ 4 = 229 cfs

- The IWC has changed from the previous permit reissuance due to a slight increase in effluent flow rate and updated receiving water low flow information.

- 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 WET tests conducted on Outfall 001 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. 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. Data collected prior to 2005 is excluded from this analysis.

WET Data History

Date Test Initiated	Acute Results LC_{50} %				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?	
04/28/2005	>100	>100	Pass	Yes	44.41	>100	Pass	Yes	
09/14/2006	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
09/23/2010	>100	>100	Pass	No	>100	>100	Pass	No	1
11/01/2011	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
03/19/2013	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
04/29/2014	>100	>100	Pass	Yes	98.8	87.3	Pass	Yes	
03/14/2017	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
05/08/2018	>100	>100	Pass	Yes	63.8	>100	Pass	Yes	

09/10/2019	>100	>100	Pass	Yes	>100	>100	Pass	Yes	
11/03/2020	>100	>100	Pass	Yes	53.1	>100	Pass	Yes	
02/09/2021	>100	>100	Pass	Yes	>100	>100	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 = [(TU_a effluent) (B)(AMZ)]
  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 = [(TU_c effluent) (B)(IWC)]

Chronic WET Limit Parameters

TUc (maximum) $100/IC_{25}$	**B** (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	IWC
100/44.41 = 2.25 TU_c	2.6 Based on 4 detects	13%

[(TUc effluent) (B)(IWC)] = 0.76 < 1.0

Therefore, no reasonable potential is shown for acute or chronic WET limits using the procedures in s. NR 106.08(6) and representative data from 2005 to 2021.

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: https://dnr.wisconsin.gov/topic/Wastewater/WET.html.

WET Checklist Summary – Outfall 001

Attachment #1

	Acute	Chronic
AMZ/IWC	Not Applicable. **0 Points**	IWC = 13%. **0 Points**
Historical Data	1 detect test used to calculate RP. No tests failed. **0 Points**	4 detect tests used to calculate RP. No tests failed. **0 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	Reasonable potential for limits for chlorine based on ATC (5 pts); Cd, Cr, Cu, Hg, Zn and chloride detected. (3 pts) Additional Compounds of Concern: Barium, Boron, and Manganese detected (2 pts) **10 Points**	Reasonable potential for limits for zero substances based on CTC; Cd, Cr, Cu, Hg, Zn and chloride detected. (3 pts) Additional Compounds of Concern: Barium, Boron, and Manganese detected (2 pts) **5 Points**
Additives	3 Biocides and 16 Water Quality Conditioners added. P treatment chemical other than Ferric Chloride (FeCl), Ferrous Sulfate ($FeSO_4$), or alum used: No **20 Points**	All additives used more than once per 4 days. **20 Points**
Discharge Category	Pulp and Paper Mill **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**
Total Checklist		**45 Points**
Recommended Monitoring Frequency		2x yearly
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 **two acute WET tests per year and two chronic WET tests per year are recommended in the reissued permit**. 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).

- A minimum of annual acute and chronic monitoring is recommended because Ahlstrom-Munksjo Thilmany is a Primary Industry. The monitoring recommendations from the WET checklist meet this threshold.

PART 7 – 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).

Additive Parameters

Additive Name	Manufacturer	Purpose of Additive including where added	Max Daily Usage Rate	Estimated Effluent Concentration mg/L	Potential Use Restriction: Secondary Acute Value mg/L[1]
Sodium Hypochlorite	Hydrite	Biocide	1500 gal	77.07	-
Nalco 60620 - ammonium sulfate	Nalco	Halogen Stabilizer	75 gal	3.85	112.31
Alum - aluminum sulfate	Affinity	Flocculent	2300 gal	118.17	0.338
Nalclear 8173 PULV	Nalco	Flocculent	20 lbs	0.12	7.69
Sodium Bromide	Nalco	pH Control	30 gal	1.54	-
Delta - Floc 1111	Nalco	Flocculent	40 gal	2.06	0.38
Nalco 7649	Nalco	Biocide	300 lb	1.85	0.20
Nalco 7678	Nalco	Biocide	600 lb	3.70	0.25
Nalco 356	Nalco	Neutralizing amine	19 gal	0.98	5.77
Trasar 22105	Nalco	Iron dispersant - 1500#	1 gal	0.05	296.00
NexGuard 22310	Nalco	Iron dispersant - 600#	2.4 gal	0.12	127.00
Elimin-Ox	Nalco	Oxygen scavenger	16 gal	0.82	7.38
Nalco 2	Nalco	Sodium aluminate	11 gal	0.57	4.92
BT-1000	Nalco	Phosphate	7 gal	0.36	272
Aqua ammonia	Hydrite	Wastewater nutrient	570 gal	29.28	-

Attachment #1

Additive Name	Manufacturer	Purpose of Additive including where added	Max Daily Usage Rate	Estimated Effluent Concentration mg/L	Potential Use Restriction: Secondary Acute Value mg/L[1]
Phosphoric Acid	Hydrite	Wastewater nutrient	120 gal	6.17	-
Nalco 7507	Nalco	Wastewater defoamer	190 gal	9.76	76.92
Sulfuric Acid	Norfalco	Wastewater pH control	150 gal	7.71	-
Del Pac1000 (Polyaluminum Chloride)	USALCO	Wastewater flocculent	110 gal	5.65	0.452
Nalco 62606	Nalco	Cleaner	400 lb	2.46	30.94
Nalco 2634	Nalco	Cleaner	900 lb	5.54	0.82
Nalco 2642	Nalco	Cleaner	900 lb	5.54	9.95
Pergasol Black 18L	Solenis	Dye	18900 lb	116.43	40.18
Pergasol Yellow 76LN	Solenis	Dye	24300 lb	149.70	45.66
Basozol Brown 43L	Solenis	Dye	9430 lb	58.09	0.17
Pergasol Red PR396 L	Solenis	Dye	8700 lb	53.59	45.66
Pergasol Yellow 49L	Solenis	Dye	9380 lb	57.78	45.66
Pergasol C Blue 67L	Solenis	Dye	9180 lb	56.55	0.45
Basozol Violet 94L	Solenis	Dye	2250 lb	13.86	0.00150
Pergasol Blue PR377L	Solenis	Dye	1320 lb	8.13	45.66
Basozol Green 16LN	Solenis	Dye	840 lb	5.17	0.0457
Pergasol Orange PR268L	Solenis	Dye	10480 lb	64.56	45.66
Pergasol Red 51L	Solenis	Dye	860 lb	5.30	45.66
Pergasol Red 50L	Solenis	Dye	7560 lb	46.57	45.66
Pergasol Blue 2R-Z	Solenis	Dye	2880 lb	17.74	0.55
Ponolith Yellow 2GN-P	Kemira	Dye	3800 lb	23.41	34.49
Pontamine Green 2B	Kemira	Dye	1500 lb	9.24	81.37
Pergasol C Blue 77LS	Solenis	Dye	5000 lb	30.80	35.48
Ponolith Black DK	Kemira	Dye	110 lb	0.68	2.44
Pergasol C Blue 49 LS	Solenis	Dye	500 lb*	3.08	45.66
Pontamine Bordeaux 8B	Kemira	Dye	1200 lb	7.39	19.82
Halopoint Tinting Blue	Kemira	Dye	240 lb	1.48	0.0323
Pontamine Violet 6B	Kemira	Dye	2810 lb	17.31	101.32
Pontamine Blue 3R	Kemira	Dye	15 lb	0.09	101.32
Pergasol Yellow 97L	Solenis	Dye	1020 lb	6.28	0.16
Pontamine Fast Red 8BLX	Kemira	Dye	500 lb*	3.08	168.63
Direct Yellow TGX-N	Sensient	Dye	730 lb	4.50	4.56
Elcomine Yellow TGX-N	Chromascape	Dye		4.74	76.92

Attachment #1

Additive Name	Manufacturer	Purpose of Additive including where added	Max Daily Usage Rate	Estimated Effluent Concentration mg/L	Potential Use Restriction: Secondary Acute Value mg/L[1]
Elcomine Green 2B	Chromascape	Dye	2265 lbs	13.95	45.66

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

An estimated max discharge concentration was estimated for each additive based on the provided max dosage rate and an effluent flow rate of 19.464 MGD, assuming no degradation or removal of the additive prior to discharge. Based on the provided toxicity data and estimated discharge concentrations, the allowable discharge level may be exceeded by the following additives. These additives are marked in red in the table above:

Alum - aluminum sulfate
Delta - Floc 1111
Nalco 7649
Nalco 7678
Nalco 2634
Pergasol Black 18L
Pergasol Yellow 76LN
Basozol Brown 43L
Pergasol Red PR396 L
Pergasol Yellow 49L
Pergasol C Blue 67L
Basozol Violet 94L
Basozol Green 16LN
Pergasol Orange PR268L
Pergasol Red 50L
Pergasol Blue 2R-Z
Halopoint Tinting Blue
Pergasol Yellow 97L

These additives may only be approved for discharge at concentrations below the Secondary Acute Value (SAV). The facility may provide a more detailed estimate of the discharge concentration in order to demonstrate that these additives will be removed from the discharge or degrade such that the discharge concentration is lower than the SAV. For example, flocculants are often considered to not be part of the final discharge since they will be removed with the solids, and products used paper-making are mostly retained in the final product and its often estimated that only a trace concentration will be present in the effluent.

The maximum possible effluent concentrations of all other additives in the table above are lower than the calculated limits for protection of aquatic life. Therefore, these additives are approved at the listed usage rates. Secondary values are not calculated for the chlorine and bromine additives, because these substances will be regulated by the total halogens limit. No secondary values were calculated for Aqua Ammonia or Phosphoric Acid because these additives would be regulated by ammonia and phosphorus limits if these products were discharged at a level of concern. Similarly, the use of Sulfuric Acid would be regulated by pH limits.

Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

						Temp Dates	Flow Dates
Facility:	Ahlstrom-Munksjo Thilmany		**7-Q_{10}:**	916.00	cfs		
Outfall(s):	001		**Dilution:**	25%		**Start:**	01/03/17	01/01/17
Date Prepared:	04/22/2022		**f:**	1		**End:**	02/28/22	02/28/22
Design Flow (Qe):	19.46	MGD	**Stream type:**	Lower Fox River			
Storm Sewer Dist.	0	ft	**Qs:Qe ratio:**	7.6	: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	35	49	76	2481	21.329	21.700	1	86	88	NA	120
FEB	35	50	76	1911	21.700	22.700	1	86	90	NA	120
MAR	38	52	77	2087	21.271	22.300	1	90	91	NA	120
APR	50	55	80	1848	22.786	24.300	1	93	95	116	120
MAY	62	65	83	1660	19.786	22.700	1	93	96	103	120
JUN	73	76	85	1430	19.514	20.900	1	94	96	109	120
JUL	77	81	87	1290	19.743	22.400	1	94	98	119	120
AUG	76	80	86	1120	21.586	23.000	1	95	97	110	120
SEP	68	73	85	1050	22.400	27.400	1	92	94	106	120
OCT	53	61	80	1160	18.914	20.200	1	91	94	NA	120
NOV	42	50	78	1632	19.171	20.300	1	90	94	NA	120
DEC	35	49	76	2231	19.529	20.400	1	85	88	NA	120

Attachment #2

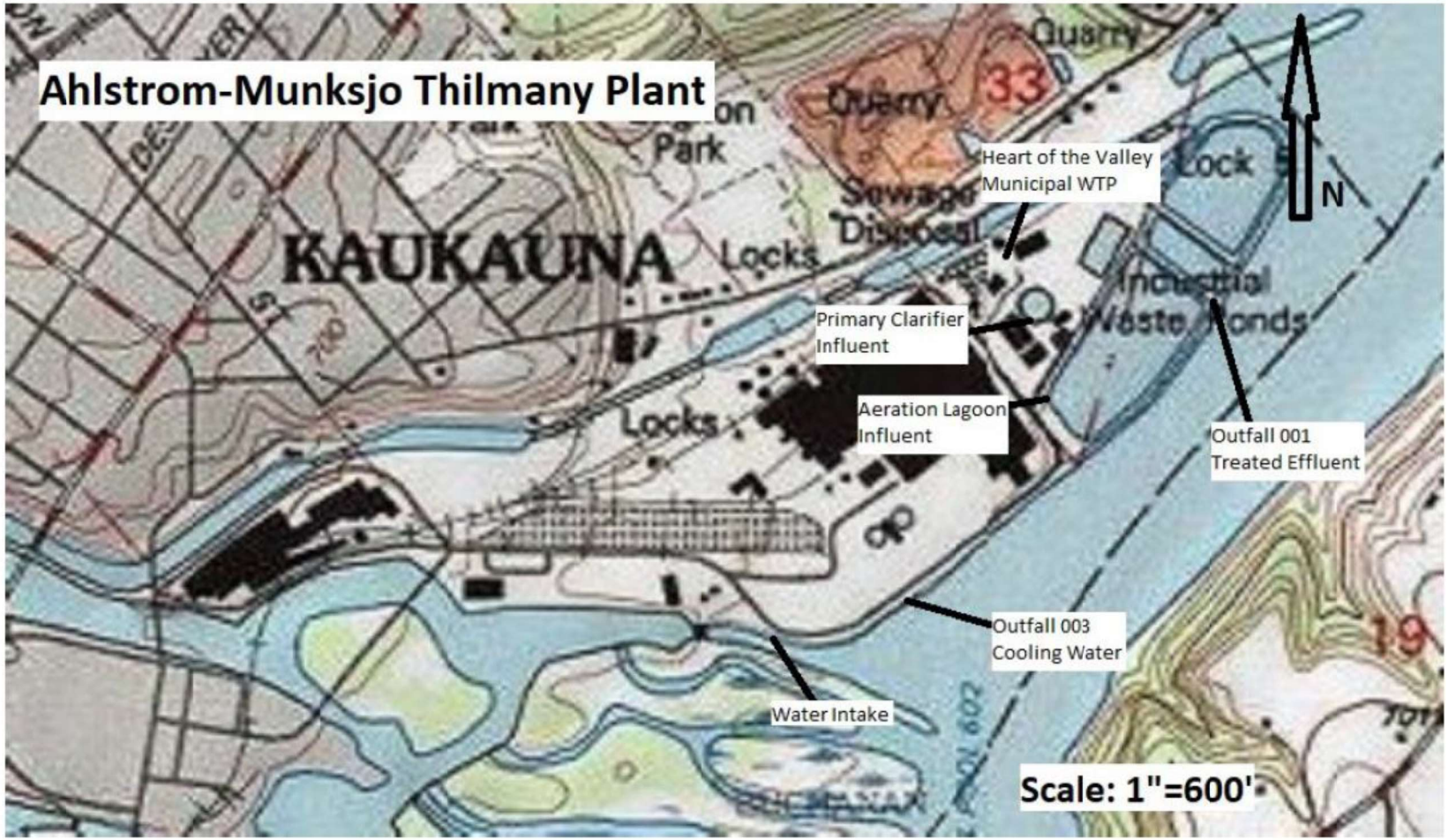
Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

						Temp Dates	Flow Dates
Facility:	Ahlstrom-Munksjo Thilmany		**7-Q_{10}:**	916.00	cfs		
Outfall(s):	001		**Dilution:**	25%		**Start:**	04/25/17	01/01/17
Date Prepared:	04/22/2022		**f:**	1		**End:**	11/18/21	02/28/22
Design Flow (Qe):	43.87	MGD	**Stream type:**	Lower Fox River			
Storm Sewer Dist.	0	ft	**Qs:Qe ratio:**	3.4	: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	35	49	76	2481	0.000	0.000	1			#DIV/0!	#DIV/0!
FEB	35	50	76	1911	0.000	0.000	1			#DIV/0!	#DIV/0!
MAR	38	52	77	2087	0.000	0.000	1			#DIV/0!	#DIV/0!
APR	50	55	80	1848	34.271	34.800	1	80	98	94	120
MAY	62	65	83	1660	60.914	67.800	1	98	102	**75**	120
JUN	73	76	85	1430	45.071	67.300	1	105	110	**88**	114
JUL	77	81	87	1290	78.300	84.100	1	108	112	**88**	**102**
AUG	76	80	86	1120	64.871	72.200	1	106	110	**87**	**101**
SEP	68	73	85	1050	45.000	55.100	1	118	122	**87**	**120**
OCT	53	61	80	1160	53.371	55.900	1	98	101	**81**	120
NOV	42	50	78	1632	28.786	30.000	1	89	106	115	120
DEC	35	49	76	2231	0.000	0.000	1			#DIV/0!	#DIV/0!

Attachment #3



CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: March 12, 2025

TO: Amanda Perdzock – WY/3

FROM: Diane Figiel – WY/3 *Diane Figiel*

SUBJECT: Water Quality-Based Effluent Limitations for Ahlstrom NA Specialty Solutions LLC Thilmany WPDES Permit No. WI-0000825-10-0

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 Ahlstrom Munksjo NA Specialty Solutions LLC Thilmany in Outagamie County. This facility discharges to the Fox River, located in the Fox River/Appleton Watershed in the Lower Fox River Basin.

Based on our review, a daily maximum temperature limit of 120 °F is recommended at Outfall 003 for the months of April, July and August. The weekly average temperature limits from the current permit may be removed in the reissued permit and temperature monitoring is recommended year-round.

BACKGROUND

WQBEL Memo Recommendations

This is an update to the recommended effluent limitations in the June 28, 2023 memo from Rachel Fritz which recommended the following limits for temperature at outfall 003 using a default 25% mixing zone. A 2018 mixing zone study demonstrated that the thermal mixing zones from Outfalls 001 and 003 do not overlap, therefore, these discharges from the two outfalls were not combined in the limit calculations in this evaluation.

	Weekly Average Effluent Limitation	
MAY	75	
JUN	88	
JUL	88	102
AUG	87	101
SEP	87	120
OCT	81	

New Information

A memo in the permit file dated April 13, 2020 approved a mixing zone up to 80% for the purposes of the calculation of temperature limits based on a zone of free passage. This conclusion requires a reevaluation

of the effluent limits considering this mixing zone study and using the most recent 5 year of effluent flow and temperature data.

Recalculated 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 January 1, 2020 and November 30, 2024.

The table below summarizes the calculated limits using these updated effluent flow rates along with the maximum effluent temperatures reported during monitoring from this same time period.

Monthly Temperature Effluent Data & Limits (outfall 003)

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN				
FEB				
MAR				
APR	62	98*	-	**120**
MAY	98	111	116	120
JUN	104	109	112	120
JUL	108	120	109	**120**
AUG	103	**122**	109	**120**
SEP	109	114	-	120
OCT	102	109	-	120
NOV	81	88	-	120
DEC				

*The daily maximum 99th percentile of representative data is 125 °F for April

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

Comparing the representative highest effluent temperature to the calculated effluent limits determines the reasonable potential of exceeding the effluent limits. Based on this analysis, daily maximum temperature limits are needed for the months of April, July, and August.

Based on the available effluent data, no weekly average effluent limits are recommended for temperature using a mixing zone study of 80%. A review of the data shows that with a mixing zone of 75% there is not reasonable potential to exceed the effluent limits. The complete thermal table used for the limit calculation is attached.

ANTIDEGRADATION/ANTIBACKSLIDING

The current permit limits for temperature in the table below became effective August 31, 2021. The weekly average limits apply to outfall 015, the flow-weighted temperature of the calculated combined discharges from Outfalls 001 and 003.

Temperature	Weekly Average
June	89 °F
July	89 °F
August	93 °F
September	92 °F
October	94 °F

Because the limits are effective in the current permit antidegradation and antibacksliding must be considered in order to allow for less stringent limitations, including dropping current permit limits. The facility has not installed treatment in order to meet these new limits and has solely relied on additional intake and dilution in attempts to meet the limits.

The current permit limits were calculated prior to the mixing zone study being approved and used the default 25% mixing zone and considered the mixing zones to overlap. The approval of a larger mixing zone would be considered to be new information available consistent with s. NR 207.12(3)(b)2.

> s. NR 207.12(3)(b)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.

The antidegradation requirements in ch. NR 207.04 must be met in order to remove the current weekly average limits. An assessment of existing effluent data shows that the weekly average discharge equals or exceeds 85% of a weekly average effluent limitation established in a permit for 4 consecutive weeks which meets the requirements in s. NR 207.04(1)(a)1c.

In addition, in order for the weekly average limits to be removed from the permit, the facility must successful complete the requirements in ss. NR 207.04(1)(c). The facility proposed meeting the temperature limits using dilution by pulling in additional water from the Fox River in order to lower the temperature of this discharge. Effluent limitations for temperature are recalculated at each permit issuance using actual discharge flow rates rather than design flows. The increased effluent flows that result from the increased water to provide dilution to meet the temperature limits will result in even more restrictive effluent limits at the next permit issuance which is not a sustainable long term plan for meeting temperature limits. In addition, the withdrawal of additional water for dilution would have an adverse environmental impact to the aquatic life due to the resulting impingement and entrainment at the intake structure. Taking all of this into consideration, the discharger will be increasing efficiency with the removal of the limits and the demonstration in s. NR 207.04(1)(c)1(c) is satisfactorily shown.

The mixing zone study conducted by the facility shows that the thermal plume appears to stay close to the west bank on the river but dissipates relatively quickly and there is a significant zone of free passage. Based on these observations the removal of the weekly average limits will not result in significant lowering of water quality therefore the requirements of s. NR 207.04(1)((d) do not apply.

Finally, the antibacksliding requirements in s. NR 207.12(1)(a) and (b) would also be met because the removal of these limits from the permit meets state water quality standards as there is no reasonable potential to exceed the newly calculated limits and there are no effluent limit guidelines for temperature. The mixing zone study conducted in 2018 and approved by the department in 2020 demonstrated that water quality standards for temperature will be met.

Facility:	Ahlstrom Munksjo Thilmany		**Data Range**	**7Q10**	916	cfs
Outfall(s):	003	**Start:**	01/01/20	**Dilution:**	75%	
Date Prepared:	5-Feb-25	**End:**	11/30/24	**f:**	1	
Design Flow (Qe):	43.87	MGD	Lower Fox River	**type:**		
Region:	NER			**Qs:Qe ratio:**	10.1	:1
				Calculation Needed?	YES	

Month	Water Quality Criteria			Receiving Water Flow Rate (7Q10)	Representative Highest Effluent Flow Rate (Qe)		Representative Highest Monthly Effluent Temperature		99th Percentile of Representative Data		**Calculated Effluent Limits**	
	Ta (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Ave (Qesl)	Daily Max Flow Rate (Qea)	Weekly Ave	Daily Max	Weekly Ave	Daily Max*	**Weekly Ave Limit**	**Daily Max Limit**
	(°F)	(°F)	(°F)	(cfs)	(mgd)	(mgd)	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
JAN	35	49	76	1281	0.000	0.000					#DIV/0!	#DIV/0!
FEB	35	50	76	1911	0.000	0.000					#DIV/0!	#DIV/0!
MAR	38	52	77	2087	0.000	0.000					#DIV/0!	#DIV/0!
APR	50	55	80	1848	34.271	34.800	62	98	66	125	-	120
MAY	62	65	83	1660	44.357	60.300	98	111	105	NA	116	120
JUN	73	76	85	1430	53.114	57.600	104	109	103	NA	112	120
JUL	77	81	87	1290	78.300	84.100	108	120	106	NA	109	120
AUG	76	80	86	1120	64.871	72.200	103	**122**	106	NA	109	120
SEP	68	73	85	1050	38.171	46.500	109	114	104	NA	-	120
OCT	53	61	80	1160	34.929	41.100	102	109	94	NA	-	120
NOV	42	50	78	1632	29.400	34.700	81	88	81	88	-	120
DEC	35	49	76	2231	0.000	0.000					#DIV/0!	#DIV/0!

CORRESPONDENCE / MEMORANDUM _____ **State of Wisconsin**

DATE: May 8, 2014 FILE REF: 3200

TO: Mike Hammers – WQ/3

FROM: Jim Schmidt – WQ/3

SUBJECT: Technology-Based and TMDL-Based Effluent Limitations for Expera Specialty Solutions, LLC (WPDES Permit # WI-0000825) - CORRECTED

The following memo represents a correction from my previous memo to Rick Reichardt dated April 27, 2014. The correction relates to the TSS limits which had an error in the calculation and application. Please replace the April 27, 2014 memo with this one.

The purpose of this memo is to calculate the allocated mass effluent limitations for TSS and phosphorus at the Expera treatment facility based on the Lower Fox River Basin Total Maximum Daily Load (TMDL) allocation.

The proposed effluent limitations for the permittee are as follows:

WPDES Permit # WI-0000825, Expera Specialty Solutions, LLC Outfall 001
Based on the Expera allocation alone)

Parameter	Effluent Limitations
Total Suspended Solids:	
TMDL-Based	4,089 lbs/day monthly average and 9,162 lbs/day daily maximum
Technology-Based	11,316 lbs/day monthly average and 21,720 lbs/day daily maximum
Total Phosphorus:	
TMDL-Based	39 lbs/day six-month average (November – April, May – October) and 116 lbs/day monthly average
Technology-Based	1.0 mg/L rolling 12-month average

Based on the Expera plus AIM allocations)

Parameter	Effluent Limitations
Total Suspended Solids:	
TMDL-Based	4,497 lbs/day monthly average and 10,077 lbs/day daily maximum
Technology-Based	11,316 lbs/day monthly average and 21,720 lbs/day daily maximum
Total Phosphorus:	
TMDL-Based	72 lbs/day monthly average (with no six-month average)
Technology-Based	1.0 mg/L rolling 12-month average

Monitoring frequency = Five times per week for TSS, once per week for phosphorus (same as current permit)

TMDL Limits) Revisions to the administrative rules for phosphorus discharges took effect on December 1, 2010. These rule revisions include additions to ch. NR 102 (s. NR 102.05), which establish phosphorus standards for surface waters. Revisions to ch. NR 217 (s. NR 217, Subchapter III) establish

procedures for determining water quality based effluent limits for phosphorus, based on the applicable standards in ch. NR 102.

Section NR 217.16, Wis. Adm. Code, states that the Department may include a TMDL-derived water quality based effluent limit (WQBEL) for phosphorus in addition to, or in lieu of a s. NR 217.13 WQBEL in a WPDES permit. Because the discharge is to a water body which is an impaired segment that is covered under the approved TMDL for the Lower Fox River Basin, the TMDL-based limit is protective of the immediate receiving water as well as downstream waters and can be included in the WPDES permit absent the s. NR 217.13 WQBEL. This limit should be expressed in a manner consistent with the wasteload allocation and assumptions of the TMDL. If after two permit terms, the Department determines the nonpoint source load allocation has not been substantially reduced, the Department may include the s. NR 217.13 WQBEL unless these reductions are likely to occur.

Evaluation of Current Phosphorus and TSS Allocations in TMDL]

TMDL Limits – Phosphorus

The total phosphorus (TP) effluent limits are calculated based on the wasteload allocation (WLA), given in pounds per year, in the Lower Fox River TMDL for Total Phosphorus and Total Suspended Solids, which was approved by EPA on May 18, 2012. WLAs presented therein are converted to WPDES permit effluent limits according to the procedures presented in the Final Guidance for Implementing TMDLs in Wisconsin, dated December 16, 2012.

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 WLAs would not be consistent with the assumptions and requirements of the TMDL. Therefore, limits given to facilities included in the Lower Fox River TMDL are given monthly average mass limits and, if the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits. The following equation shows the calculation of equivalent effluent concentration:

TP Equivalent Effluent Concentration = WLA ÷ (365 days/yr * Flow Rate * Conversion Factor)
= 11,976 lbs/yr ÷ (365 days/yr * 18.27 MGD * 8.34)
= 0.22 mg/L

Where: Peak annual average flow = 18.27 MGD (since the current permit was issued on 8/1/2010, the peak occurred 8/1/2010 – 7/31/2011 which coincidentally was the first full year of the current permit term)

Since this value is below 0.3 mg/L, both a six-month average and a monthly average mass limit are applicable for total phosphorus. The monthly average limit is three times the six-month average.

TP 6-Month Average Permit Limit = WLA ÷ 365 days/yr * 6-month multiplier
= (11,976 lbs/yr ÷ 365 days/yr) * 1.18
= 38.72 lbs/day (39 after rounding)

TP Monthly Average Permit Limit = 3 * 6-Month Average Permit Limit
= 3 * 38.72 lbs/day
= 116.15 lbs/day (116 after rounding)

The multiplier used in the six-month average calculation was determined according to implementation guidance. Phosphorus monitoring was required in the previous permit at a frequency of once per week. Based on that, a coefficient of variation (CV) was calculated based on mass effluent loadings calculated between August 1, 2010 and December 31, 2013 (to be representative of operations and loadings during the current permit term). Multipliers are summarized for alternative monitoring frequencies in the following table if needed.

The calculated CV at Expera was determined to be 0.36. However, that was calculated based on the permittee's ability to meet its current permit limit of 1.0 mg/L. Usually, since additional treatment is likely to be necessary to achieve a more stringent limit (based on the equivalent effluent concentration being below 0.3 mg/L), the default CV of 0.6 is used to calculate the TMDL limits. Since the calculated CV based on current data is lower than 0.6, the actual CV value is used here. The following table lists the multiplier for daily sampling at a CV of 0.36 along with multipliers for other monitoring frequencies. The equations provided in Table 5-2 of EPA's 1991 Technical Support Document for Water Quality-Based Toxics Control were used to calculate the multipliers.

Multipliers with Annual WLAs and CV of 0.36

Effluent Monitoring Frequency	Six-Month Average Permit Limit Multiplier	Effluent Monitoring Frequency	Six-Month Average Permit Limit Multiplier
Daily	1.06	3 Times per Week	1.10
6 Times per Week	1.07	Twice per Week	1.12
5 Times per Week	1.08	Weekly or Less	1.18
4 Times per Week	1.08		

Phosphorus limits of **39 lbs/day as a six-month average and 116 lbs/day as a monthly average** are recommended for the reissued permit, after rounding. A six- month average limit should be averaged May – October and November – April of each calendar year. The limit is based on a monitoring frequency of once per week. For informational purposes, the limit is equivalent to a concentration of 0.67 mg/L (after rounding) at a peak annual average flow rate of 18.27 MGD.

Reference Dates	Six-Month Average P (lbs/day)	# of 6-Mo. Periods with Average Daily Mass > 39 lbs/day	Maximum Monthly Average P (lbs/day)	# of Months with Average Daily Mass > 116 lbs/day
11/2010 – 4/2011	87.1	1 / 1	111.4	0 / 6
5/2011 – 10/2011	79.4	1 / 1	93.9	0 / 6
11/2011 – 4/2012	82.3	1 / 1	107.3	0 / 6
5/2012 – 10/2012	91.7	1 / 1	122.5	1 / 6
11/2012 – 4/2013	70.9	1 / 1	75.2	0 / 6
5/2013 – 10/2013	96.5	1 / 1	129.0	1 / 6

TMDL Limits – Total Suspended Solids

The Lower Fox River TMDL also has wasteload allocations for total suspended solids (TSS). For an industrial facility the limits for TSS must be expressed as a daily maximum and a monthly average. The

TSS limits are calculated by converting the yearly WLA to monthly and weekly limits, as described in guidance. The following equations show the TSS limit calculations for the Expera facility:

TSS Monthly Average Permit Limit = WLA ÷ 365 days/yr * monthly multiplier
= (1,122,241 lbs/yr ÷ 365 days/yr) * 1.33
= 4,089 lbs/day
TSS Daily Maximum Permit Limit = WLA ÷ 365 days/yr * daily multiplier
= (1,122,241 lbs/yr ÷ 365 days/yr) * 2.98
= 9,162 lbs/day

The multipliers used in the above limit calculations were determined according to implementation guidance. The approach is similar to that described earlier for phosphorus, but the CV and multiplier are different than those for phosphorus. A coefficient of variation was calculated, based on all TSS mass monitoring data calculated from data submitted between October 1, 2010 and December 31, 2013, to be 0.57. Monitoring for TSS is specified at five times per week in the current permit and it is believed this monitoring frequency will remain the same. Based on these two variables, the following table is used to come up with the multipliers of 1.33 for monthly limits and 1.74 for daily limits. If there is a change in monitoring frequency, the stated limits should be re-evaluated. NOTE: Since the TMDL recommended no TSS removal, the actual CV is used in this calculation rather than a treatment-based assumption such as the 0.6 CV used for phosphorus.

Multipliers with Annual WLAs and CV of 0.57

Effluent Monitoring Frequency	Monthly Average Permit Limits	Daily Maximum Permit Limits	Effluent Monitoring Frequency	Monthly Average Permit Limits	Daily Maximum Permit Limits
Daily	1.27	2.98	3 Times per Week	1.44	2.98
6 Times per Week	1.30	2.98	Twice per Week	1.56	2.98
5 Times per Week	1.33	2.98	Weekly or Less	1.60	2.98
4 Times per Week	1.38	2.98			

Total suspended solids limits of **4,089 lbs/day as a monthly average and 9,162 lbs/day as a daily maximum** are recommended for the reissued permit in addition to the mass limits required for pulp and paper manufacturing in ch. NR 284. For informational purposes, these mass limits are equivalent to concentrations of 26.8 mg/L and 60.1 mg/L (after rounding) at a peak annual average flow rate of 18.27 MGD. For comparison purposes, the following table summarizes estimated monthly average and daily maximum TSS loadings from the Expera facility from August 2010 through December 2013.

Calendar Year	Maximum Monthly Average TSS (lbs/day)	# of Months with Average Daily Mass > 4,089 lbs/day	Maximum Daily TSS (lbs/day)	# of Days with Mass > 9,162 lbs/day
2010 (5 months)	5731	3 / 5	10679	4 / 153
2011	6942	9 / 12	19269	11 / 364
2012	8257	7 / 12	19714	28 / 366
2013	4183	1 / 12	10446	1 / 359

The purpose of the preceding summaries is to assist in the determination of the need for a compliance schedule. Based on the above information, it appears that a compliance schedule may be needed for both the monthly average and daily maximum limits because data from August 2010 – December 2013 shows some peak values in excess of the limits.

Interim Limit – Total Suspended Solids

An interim limit can be applied when a compliance schedule is included in the permit to meet more stringent effluent limits, e.g., TMDL-based limits. This interim 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. Since the Expera facility already has TSS limits in its permit (11,316 lbs/day monthly average and 21,720 lbs/day daily maximum), they will be sufficient to serve as the interim limits if necessary.

Evaluation of Potential Increases Related to AIM Reallocation from TMDL]

There is a potential increase to be considered here based on a possible reallocation of the current allocation associated with AIM Demolition (WPDES Permit # WI-0000698, formerly NewPage – Kimberly). Since that facility also had allocated phosphorus and TSS loads in the Lower Fox TMDL, it is possible to estimate the impact of that reallocation on Expera's WPDES permit. It is recognized the reallocation would involve public noticing and a potential antidegradation review, but the evaluation here shall only address what the new limits may be. This is not intended to suggest any formal recommendations in terms of either permit.

Lower Fox River TMDL Allocations for WPDES Permit # WI-0000698:
Phosphorus = 5,648 lbs/year
TSS = 111,969 lbs/year

If these allocations were simply added to those mentioned earlier for Expera, the combined allocations would be:
Phosphorus = 5,648 lbs/year (AIM) + 11,976 lbs/year (Expera) = 17,624 lbs/year (total)
TSS = 111,969 lbs/year (AIM) + 1,122,241 lbs/year (Expera) = 1,234,210 lbs/year (total)

Reallocated TMDL Limits – Phosphorus

$$\text{TP Equivalent Effluent Concentration} = \text{WLA} \div (365 \text{ days/yr} * \text{Flow Rate} * \text{Conversion Factor})$$
$$= 17{,}624 \text{ lbs/yr} \div (365 \text{ days/yr} * 18.27 \text{ MGD} * 8.34)$$
$$= 0.32 \text{ mg/L}$$

NOTE: No additional flow is assumed for this reallocation.

Since this value is slightly above 0.3 mg/L, only a monthly average mass limit is applicable for total phosphorus.

$$\text{TP Monthly Average Permit Limit} = \text{WLA} \div 365 \text{ days/yr} * \text{monthly multiplier}$$
$$= (17{,}624 \text{ lbs/yr} \div 365 \text{ days/yr}) * 1.49$$
$$= 71.94 \text{ lbs/day (72 after rounding)}$$

For comparison purposes, the once per week monitoring frequency is maintained here, but the table below will indicate the multipliers for alternative monitoring frequencies. The multiplier used in the six-

month average calculation was determined according to implementation guidance. The CV of 0.36 is also maintained for the preliminary evaluation of the reallocation.

Multipliers with Annual WLAs and Default CV of 0.36

Effluent Monitoring Frequency	Monthly Average Permit Limit Multiplier	Effluent Monitoring Frequency	Monthly Average Permit Limit Multiplier
Daily	1.16	3 Times per Week	1.27
6 Times per Week	1.18	Twice per Week	1.33
5 Times per Week	1.20	Weekly or Less	1.49
4 Times per Week	1.23		

A phosphorus limit of **72 lbs/day as a monthly average** is calculated for the reallocated discharge. Note that the new monthly average limit is actually quite a bit lower than the 116 lbs/day monthly average limit based on only Expera's allocation, but the six-month average limit of 39 lbs/day from the original allocation to Expera alone would go away. Therefore, although the averaging periods are different, the most stringent limit increases from 39 lbs/day to 72 lbs/day. For informational purposes, the 72 lbs/day limit is equivalent to a concentration of 0.47 mg/L (after rounding) at a peak annual average flow rate of 18.27 MGD.

Reference Dates	Maximum Monthly Average P (lbs/day)	# of Months with Average Daily Mass > 72 lbs/day
11/2010 – 4/2011	111.4	5 / 6
5/2011 – 10/2011	93.9	4 / 6
11/2011 – 4/2012	107.3	4 / 6
5/2012 – 10/2012	122.5	4 / 6
11/2012 – 4/2013	75.2	3 / 6
5/2013 – 10/2013	129.0	6 / 6

Reallocated TMDL Limits – TSS

TSS Monthly Average Permit Limit = WLA ÷ 365 days/yr * monthly multiplier
= (1,234,210 lbs/yr ÷ 365 days/yr) * 1.33
= 4,497 lbs/day
TSS Daily Maximum Permit Limit = WLA ÷ 365 days/yr * daily multiplier
= (1,234,210 lbs/yr ÷ 365 days/yr) * 2.98
= 10,077 lbs/day

The same multipliers would be used as for the initial TSS evaluation since effluent variability is not affected by the reallocation.

Total suspended solids limits of **4,497 lbs/day as a monthly average and 10,077 lbs/day as a daily maximum** are calculated for the reallocation. These limits are equivalent to concentrations of 30 mg/L and 66 mg/L after rounding, respectively, based on the peak annual average flow of 18.27 MGD.

Because of the reallocation, these limits are slightly greater than those in the initial calculation above; the increase is slightly over 10%.

Calendar Year	Maximum Monthly Average TSS (lbs/day)	# of Months with Average Daily Mass > 4,497 lbs/day	Maximum Daily TSS (lbs/day)	# of Days with Mass > 10,077 lbs/day
2010 (5 months)	5731	1 / 5	10679	2 / 153
2011	6942	6 / 12	19269	5 / 364
2012	8257	4 / 12	19714	15 / 366
2013	4183	0 / 12	10446	1 / 359

The increases result in slightly fewer exceedances based on data reported during the current permit term, but there would still be potential exceedances for both phosphorus and TSS.

If you have any questions, please contact me at (608) 267-7658 or via e-mail at jamesw.schmidt@wisconsin.gov.

Cc: Mark Corbett – Water District East / Oshkosh

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: March 12, 2024

TO: Amanda Perdzock – Madison

SUBJECT: Technology-Based Effluent Limitations for Ahlstrom NA Specialty Solutions LLC – Thilmany Facility, WPDES Permit No. WI-0000825-10-0

The Following Technology Based Effluent Limits (TBELs) are Recommended for Outfall 001:

Parameter	Daily Maximum	Daily Minimum	Monthly Average
TSS	21,720 lbs/day		11,316 lbs/day
pH	9.0 s.u.	5.0 s.u.	

The Following Technology Based Effluent Limits (TBELs) are Recommended for Outfall 011:

Parameter	Daily Maximum	Daily Minimum	Monthly Average
BOD5	13,632 lbs/day		6,987 lbs/day

Facility Description and Industrial Categories

Ahlstrom Munksjo NA Specialty Solutions LLC – Thilmany Facility produces unbleached kraft pulp and specialty kraft papers such as pressure-sensitive release liner, and industrial and food packaging. In the permit application dated June 29, 2021, the facility reported their productions activities fall under the industrial category of Pulp, Paper, and paperboard mills with production occurring under both Subpart C Unbleached Kraft, and Subpart K Nonintegrated Lightweight. The current TBELs which have been utilized since at least February 24, 1989, were calculated using standards for the Unbleached Kraft and Nonintegrated-Fine Papers (wood fiber) categories. While the Thilmany Mill produces lightweight papers compared to the basis weight of other unbleached kraft paper products such as bag paper, it does not produce lightweight papers as defined by EPA. The EPA defines lightweight papers as thin papers such as carbonizing papers and cigarette papers and does not provide a basis weight for comparison purposes. For this reason, the DNR will continue to calculate limits for the facility utilizing the Nonintegrated-Fine Papers category.

Documentation on the derivation of current TBELs is no longer available as the Department does not retain records older than ten to fifteen years other than, in the case of the Thilmany Mill, copies of issued permits going back to the fourth issuance. What follows is the Department's best guess on how current TBELs were derived.

Applicable BPT Effluent Limits

BPT effluent limits are derived pursuant to ch. NR 284, Wis. Adm. Code. Effluent limits are based on a metric of lb pollutant per 1000lbs product produced. Effluent pH is limited to the range of 5.0 to 9.0 s.u.

Subcategories	BOD_5 (lbs/Ton)		TSS (lbs/Ton)	
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Unbleached Kraft	5.6	11.2	12.0	24.0
Nonintegrated-Fine Papers (wood fiber)	8.5	16.4	11.8	22.0

Note: BCT and BPT TBELs are the same pursuant to 40 CFR § 430.33.

Calculation of Effluent Limits Based on Historic Production Trends and Categories

Production rates of kraft pulp and specialty papers believed to have been used to derive current TBELs are:

570 tons per day (TPD) Paper Production

382.5 TPD Pulp Production

Monthly Average BOD5 Effluent Limit:

(5.6 lbs BOD5/Ton x 382.5 TPD) + (8.5 lbs BOD5/Ton x 570 TPD) = 6,987 lbs BOD5/day

Daily Maximum BOD5 Effluent Limit:

(11.2 lbs BOD5/Ton x 382.5 TPD) + (16.4 lbs BOD5/Ton x 570 TPD) = 13,632 lbs BOD5/day

Monthly Average TSS Effluent Limit:

(12.0 lbs TSS/Ton x 382.5 TPD) + (11.8 lbs TSS/Ton x 570 TPD) = 11,316 lbs TSS/day

Daily Maximum TSS Effluent Limit:

(24.0 lbs TSS/Ton x 382.5 TPD) + (22.0 lbs TSS/Ton x 570 TPD) = 21,720 lbs TSS/day

Discussion

When deriving TBELs for a pulp and paper mill, total pulp production is usually applied to an integrated pulp and paper subcategory and the difference between paper production and pulp production is applied to the nonintegrated paper subcategory. For example, one would expect that the Thilmany Mill's 382.5 TPD of pulp production would be applied to the integrated unbleached kraft subcategory and 187.5 TPD of paper production would be applied to the nonintegrated-fine papers subcategory when deriving TBELs for the Thilmany Mill (i.e., 570 TD paper - 382.5 TPD integrated pulp and paper = 187.5 TPD nonintegrated paper).

In the derivation of current TBELs for the Thilmany Mill, pulp production is applied to the unbleached kraft subcategory and all of the paper production is applied to the nonintegrated-fine papers subcategory. This atypical approach is supported by observations that little recycling of water between the facility's pulp and paper mills is possible, frequent grade changes result in greater than normal water use during paper making, and the quality of paper products is much greater than that normally found at an unbleached kraft mill, which usually make a single product such as the paper for making kraft paper bags. Thus, the pulp and paper mills at the Kaukauna facility are considered separate facilities when deriving TBELs.

Such an approach to deriving TBELs is also supported by data collected by the United States Environmental Protection Agency (EPA). In EPA's October 1982 Development Document for Effluent Limitations Guidelines and Standards for the Pulp, Paper and Paperboard Point Source Category, EPA 440/1-82/025, data indicate the Thilmany Mill uses much more water and generates much more BOD5 and TSS per ton of production than the other mills in the unbleached kraft, bag and other products subcategory into which EPA placed both Wisconsin unbleached kraft mills. From Table V-5, page 130 of EPA's document:

Raw Waste Loads for Unbleached Kraft Subcategory, Bag and Other Product

Facility	Flow (kgal/ton of production)	BOD_5 (lbs/ton of production)	TSS (lbs/ton of production)
Mosinee Mill	54.6	68.4	112.6
Thilmany Mill	53.5	65.7	146.3
BPT Average[1]	12.6	33.8	43.8

[1] Long term average raw waste loads used by EPA to derive effluent limitations guidelines for the unbleached kraft, bagand other products subcategory.

From the above table it can be seen that the Thilmany Mill used over four times as much water and generated almost twice as much BOD5 and more than three times as many solids as the average mill used by EPA to derive BPT effluent limitations guidelines.

Both of Wisconsin's unbleached kraft mills produce specialty products of higher quality than bag paper and both mills use much more water and produce greater waste loads than the other mills in the unbleached kraft, bag and other products subcategory. Consequently, current TBELs in the permits of both mills are derived using the same method; i.e., the method presented above.

Current Production Rates

As part of its application for permit reissuance, the facility submitted submitted annual average production data for 2016- 2020. Dividing the reported annual averages by 365 days, the Department derived the following daily production rates:

670.59 TPD Paper Production

467.16 TPD Pulp Production

The Thilmany Mill's current production rates exceed those used to derive TBELs for the current and proposed permits. While the mill is entitled to effluent limits that are based on current rates of production, Wisconsin's antibacksliding requirements in ch. NR 207, Wis. Adm. Code, must be met before BOD5 and TSS permit limits may be increased.

Pentachlorophenol and Trichlorophenol TBELs

Ahlstrom-Munksjö has certified that it does not use chlorophenolic- containing biocides at the Thilmany Mill. Therefore, pursuant to s. NR 284.12 (2)(b), Wis. Adm. Code, neither the current permit nor the proposed permit contains TBELs for pentachlorophenol and trichlorophenol.

PREPARED BY: Amanda Perdzock – Wastewater Specialist

Mail Complete Application to:
Wisconsin Department of Natural Resources
Permits Section-WQ/3
PO Box 7921
Madison, WI 53707-7921

Phosphorus Multi-Discharger Variance Application for Industrial Facilities - s. 283.16, Wis. Stats.

Form 3200-149 (R 03/17)

Notice: Pursuant to s. 283.16, Wis. Stats, an owner of an existing permitted wastewater treatment system may apply for a variance to a phosphorus water quality based effluent limits (WQBEL). Submit completed form to the Department of Natural Resources (DNR) to request coverage under the multi-discharger variance for phosphorus. Personal information collected will be used for administrative purposes and may be provided to requestors to the extent required by Wisconsin's Open Records law [ss. 19.31-19.39, Wis. Stats.]

Facility and Permit Information

WPDES Permit No. WI- 0 | 8 | 2 | 5 | 0 | 9 | 1			
Facility Name Ahlstrom-Munksjo NA Specialty Solutions LLC			
Facility Street Address 600 Thilmany Road			
City Kaukauna	State WI	ZIP Code 54130	
Receiving Water Lower Fox River	County Outagamie		
Source of Water Supply Lower Fox River	Average Discharge Flow Rate 18.3 MGD 2016-2020 ave		

Facility Contact Information

Contact Name Mark Nessmann			
Title Environmental Manager			
Address Same as Facility			
City	State	ZIP Code	
Phone No. (incl. area code) (920) 766-8235	Fax Number		
Email Address mark.nessmann@ahlstrom-munksjo.com			

Variance Request Schedule

Check all that apply:

1. This variance is being requested at the time of application for permit reissuance pursuant to s. 283.16(4)(b)1, Wis. Stat. ☐
2. This variance is being requested within 60 days after the department reissues or modifies the permit to include a phosphorus WQBEL pursuant to s. 283.16(4)(b)2, Wis. Stat. ☐
3. This variance is being requested from a current WPDES Permit pursuant to 283.16(4)(b)3, Wis. Stat ☒

   Date of Current Permit Issuance: 12/30/2016

Note: WPDES permit must be issued prior to April 2014.

4. Has the MDV been included in previously issued WPDES Permits?

   Yes ○
   How many permits has the MDV been approved for? _____

   No ◉

Variance Requirements

5. Has this point source discharge been authorized by a WPDES permit prior to December 1, 2010? ◉ Yes ○ No

Note: If no, you are ineligible for the MDV in accordance with s. 283.16(4), Wis. Stat. STOP

6. Has this point source relocated its outfall location since December 1, 2010? ○ Yes ◉ No

7. What is the category of industrial discharge the facility is seeking coverage under for the MDV?

   ◉ Paper ○ Food Processor
   ○ Cheese ○ Aquaculture
   ○ NCCW or other similar WW
   ○ Other, Specify: _____

8. Is the point source located in an eligible MDV county as specified in Appendix H of the MDV Implementation Guidance? ◉ Yes ○ No

Note: If no, you are ineligible for the MDV in accordance with s. 283.16(4), Wis. Stat.

9. Does this limit require a major facility upgrade in order to achieve compliance? ◉ Yes ○ No

Justify:

The facility is already discharging phosphorus at as low a level as can reasonably be expected for a conventional activated sludge treatment plant. To get to the required TMDL levels a substantial upgrade in control technology and equipment is required.

Note: If no, you are ineligible for the MDV in accordance with s. 283.16(4), Wis. Stat. STOP. A major facility upgrade means that a facility needs to install new equipment and a new process such as installing filtration or equivalent technology.

10. Phosphorus Water Quality-Based Effluent Limitation from which variance is sought:

○ Concentration-based WQBEL pursuant to s. NR 217.13, Wis. Adm. Code
◉ TMDL mass-based WQBEL pursuant to s. NR 217.16, Wis. Adm. Code

Check all months for which variance is requested:

◉ All

☒ Jan	☒ Apr	☒ Jul	☒ Oct
☒ Feb	☒ May	☒ Aug	☒ Nov
☒ Mar	☒ Jun	☒ Sep	☒ Dec

11. Do you believe these limits could be achieved during the term of the permit? ○ Yes ◉ No

12. Current effluent quality

Note: Use 30-day P99 if 11 or more representative effluent samples are present. Only include effluent data for those outfall(s) a variance is being requested for.

Outfall Number(s)	Conc. (mg/L)	Number of Samples Results Used	Sample Time Period Used	
1	0.63	260	01/01/2016	12/31/2020

13. Are applicable phosphorus limits currently effective in the WPDES permit more restrictive than 1 mg/L? ○ Yes ◉ No

Facility Information (provide attachments as necessary)

14. What are the average phosphorus levels within your influent TP concentration? 0.11 mg/L

15. What is the water supply source?

- (●) 100% directly from a surface water
- ( ) 100% directly from a well(s)
- ( ) Mix of well water and surface water
- ( ) 100% from municipal water supply or mix of municipal water and either well or surface water;

Name of water supply: _____

Does the water utility add phosphorus for corrosion control or for iron or manganese sequestration? ( ) Yes ( ) No

16. Has the treatment process at the facility been optimized to maximize its phosphorus removal capabilities?

- (●) Yes

Completion date: _____

- ( ) No, but in process of completing
- ( ) No, not yet started

17. Has a phosphorus compliance alternatives plan been approved by the Department?

- (●) Yes

Approval date: 12/31/2020

- ( ) No, but in process of completing
- ( ) No, not yet started

18. Briefly describe the technology that would need to be added to comply with phosphorus limits in your permit:
Tertiary filtration, potentially combined with chemical addition, along with new automated control systems

19. *Phosphorus-Containing Additives* - Does the facility use phosphorus-containing additives?

- (●) Yes

Can the facility discontinue the use of the phosphorus-containing products or can the product be substituted to eliminate or reduce the introduction of phosphorus? ( ) Yes (●) No

- ( ) No

20. *Internal Waste Streams*- Can the facility segregate the internal waste streams containing phosphorus and cost effectively treat this portion of the effluent?

- ○ Yes
- ◉ No
- ○ Not applicable

Attach any new or additional information that you would like to provide the Department regarding optimization measures and/or compliance alternatives planning efforts.

Projected Compliance Costs

21. What is the projected net present value cost for complying with the phosphorus WQBELs? $ 17,700,000

Source of cost projection:
NPV was calculated using a 20 year time period. $17,700,000 is based on a 10% discount rate. Using the EPA default rate of 2.5% results in an NPV of $29,600,000.
Capital cost of $6,360,000 was used and beginning O&M is $1,187,000. This includes chemical, electrical, operations and maintenance.
Additional details are available if needed.

Note: If a facility uses projected compliances costs provided in the Economic Impacts Analysis, they must certify that these costs are reasonable for the facility in question. See "projected compliance costs" in Section 2.02 of the MDV Implementation Guidance for details.

22. Has the feasibility of water quality trading or adaptive management been evaluated for the facility?
- ◉ Yes
- ○ No

23. Is the facility eligible for adaptive management or water quality trading?
- ◉ Yes
- ○ No

24. What is the needed offset to comply with AM/WQT? _____ lbs/year

☒ Unknown at this time

25. Is adaptive management or water quality trading a viable compliance option?
- ○ Yes
- ◉ No

Describe:
It is unlikely that adequate trading partners can be found for the credits needed to insure compliance for our facility. Adaptive management is wildly expensive, carries high risk, and is not at all practical for a discharger on the Lower Fox River which receives significant phosphorus loading from upstream sources.

Affordability to Industrial Dischargers

26. Do you believe phosphorus compliance costs will cause a substantial economic or social impact to the facility?

- (●) Yes, such as (check all that apply)
  - [ ] Reduction of employment
  - [x] Decrease/loss of investment
  - [x] Inability to compete
  - [ ] Potential relocation or facility closing
  - [ ] Other; Describe: _____
- ( ) No

27. Do you also send waste to a municipal wastewater treatment facility?

- (●) Yes, Name: Heart of the Valley MSD

  Are your sewer rates expected to increase due to phosphorus compliance at the municipal wastewater treatment facility?
  - ( ) Yes
  - ( ) No
  - (●) Unknown
- ( ) No

28. What is the secondary indicator score for the county the facility is located in? 4

Note: See Appendices B-F of the MDV Implementation Guidance for details.

Watershed Project. Select one of the following watershed project options:

Option A. County payment contribution (●)

Option B. Binding, written agreement with the DNR to construct a project or implement a watershed plan. ( )

Submit Form 3200-148 with MDV application

Option C. Binding, written agreement with another entity that is approved by the DNR to construct a project or implement a watershed plan. ( )

Submit Form 3200-148 with MDV application.

Certification

Based on the information provided, I believe that my permitted facility qualifies for coverage under the multi-discharger phosphorus variance based on the requirements of s. Wis. Stat. 283.16 (4), Wis. Stat. I understand that as a condition of the variance, the Department will impose interim limitations and require a watershed project or plan to be completed as part of the phosphorus reduction measures for phosphorus during the term of the variance in accordance with s. Wis. Stat. 283.16(6). I understand that these conditions will be included in the WPDES permit issued to this facility and I agree to comply with all applicable permit conditions for this variance. I hereby certify that the determination in Wis. Stat. 283.16(2)(a) applies to my permitted facility and that my permitted facility cannot otherwise comply with its phosphorus water quality based effluent limitations without a major facility upgrade. To the best of my knowledge, the information in this application is true, accurate, and complete.

Print or type name of person submitting request (Individual must be an Authorized Representative)	Title
Lee R. Hammen	Plant Manager
Signature of Official Lee R. Hammen	Date Signed 6/28/2021

Submit to Coordinator... | Save | Print... | To Catalog

State of Wisconsin
Department of Natural Resources
Bureau of Water Quality
Permits Section - WQ/3

Multi-Discharger Variance Application Evaluation Checklist

Form 3200-145 (R 5/16)

Notice: This checklist is meant to be a tool to help Department of Natural Resources (DNR) staff review municipal and industrial multi-discharger variance (MDV) applications (Forms 3200-149 and 3200-150). Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law (ss. 19.31-19.39, Wis. Stats.).

Permittee Name

Ahlstrom-Munksjö NA Speciality Solutions LLC

WPDES Permit Number	County
WI- 0 | 0 | 0 | 0 | 8 | 2 | 5	Outagamie

1. Did the point source apply for the MDV at the appropriate time?	(●) Yes ( ) No. *STOP- facility not eligible at this time.*	*See Questions 1-3.*
2. This operation is (check one):	( ) New or relocated outfall. *STOP- facility not eligible.* (●) Existing outfall	*See Questions 5-6.*
3. Is the point source is located in an MDV eligible area?	(●) Yes ( ) No. *STOP- facility not eligible.*	*Apply County information to Appendix H. Additional information provided in Q7 on municipal form & Q7-8 on industrial form.*
4. The secondary indicator score for the county (counties) the discharge is located is:	5	*See Appendices A-F. If the score is less than 2, stop; the facility is not eligible. See Q23 on municipal form & Q28 on industrial form.*
5. Is a major facility upgrade required to comply with phosphorus limits?	(●) Yes ( ) No. *STOP- facility not eligible.*	*See Q8 on municipal form/Q9 on industrial form.*
6. List the months where phosphorus limits cannot be achieved during the permit term:	☒ All ☒ Jan ☒ Apr ☒ Jul ☒ Oct ☒ Feb ☒ May ☒ Aug ☒ Nov ☒ Mar ☒ Jun ☒ Sep ☒ Dec	*Consider checking with limit calculator. If this does not match information in application, the application should be updated prior to approval.*

7. What is the current effluent level achievable?

Outfall Number(s)	Conc. (mg/L)	Method for calculation:	Does this concur with application?	
001	0.60	(●) 30-day P99 ( ) Other, specify:	( ) Yes (●) No, why not: Application used older dataset	*DNR staff should verify the effluent concentration value(s) provided. See Q11 on municipal form & Q12 on industrial form.*

8. What is the appropriate interim limitation(s) for the permit term?

0.8 mg/L as a monthly average pursuant to s. 283.16(6)(a)1. Wis. Stats.
Target Value = TMDL Limits
The interim limit may be lowered in future permit terms to conform to highest attainable condition requirements.

Provide Rationale:

The past three years of phosphorus effluent data (6/1/2019 - 5/31/2022, n= 155) yield a 30 day P99 value of 0.60 mg/L. This represents a level currently achievable, however the WQBEL memo may recommend an interim limit that differs from that shown above.

Note: See description in Section 2.02 of the MDV implementation guidance. Interim limitations should reflect the "highest attainable condition" for the permittee in question pursuant to s. 283.16(7), Wis. Stat.

Save

9. *For Industries Only*- Where does the phosphorus in the effluent come from? (check all that apply)	☒ Process ☒ Additive Usage ☐ Water supply *Can intake credits be given or can the facility use an alternative water supply?* ◯ Not feasible ◯ Possibly, but further analysis needed ◯ Not evaluated at this time	*See Q14-15 & 19 on industrial form. If the answer is "possibly" or "not evaluated", the schedule section of the MDV permit should contain a requirement to perform this analysis.*
10. Has this facility optimized?	◉ Yes ◯ In progress ◯ No	*See Q14 on municipal form & Q16 & 20 on industrial form. Facility must optimize and operate at an optimize treatment level (s. 283.16(6)(a), Wis. Stat.)If no will need compliance schedule.*
11. Has a facility plan/compliance alternative plan been completed for the facility?	◉ Yes ◯ In progress ◯ No	*See Q15 on municipal form & Q17 on industrial form.*
12. What is the projected cost for complying with phosphorus? Source:	$ 17,700,000.00 20-year NPV listed in MDV application	*Facility must submit site-specific compliance costs. If cost projections are used from EIA, the permittee must certify that these costs are reasonable for the facility in question. See "projected compliance costs" in Section 2.02 of the MDV Implementation Guidance for details.*

Comments on planning efforts:

A preliminary compliance alternatives plan (dated December 2019) was prepared by Symbiont Science, Engineering and Construction, Inc. and submitted on behalf of the Ahlstrom-Munksjö Thilmany Mill. The plan evaluates compliance solutions and alternatives surrounding the TMDL-based limit for phosphorus set at 72 lbs/day. Adaptive management is evaluated and determined to be infeasible. Water quality trading is evaluated and determined to be cost prohibitive, though the evaluation likely overestimates the amount of land required to generate the amount of credits needed. Technology-based solutions are provided - these include sand clarification, cloth filtration, and ballasted clarification. The plan also states that flocculating clarification was investigated but does not provide details on the viability of this option. After receiving further information on 10/25/22, it is evident that flocculating clarification poses a number of challenges that the Thilmany Mill has not yet overcome.

13. Are adaptive management and water quality trading viable?	◯ Yes ◯ Perhaps. Additional analysis required. ◉ No	*See Q18-21 on municipal form & Q22-25 on industrial form. If additional analyses required, the applicant may need to complete this analysis during the MDV permit term.*
14. Has the point source met the appropriate primary screener?	◯ Yes ◯ No. *STOP- facility not eligible.*	*See Q4 of this form in addition to the "eligibility" guidance in Section 2.01 of the MDV Implementation Guidance.*

Comments on economic demonstration:

After pilot testing tertiary filtration technologies, Symbiont prepared cost estimates for continuous backwash sand filtration and rotating cloth filtration. The lower cost option, rotating cloth filtration, is used in the economic demonstration. Capital costs amounted to $6,359,250 with annual O&M costs at $1,187,558. The 20-year NPV comes to $17,700,000. This value is greater than the 75th percentile cost for paper facilities (11,200,000). Outagamie county is also included in the 75th percentile for counties incurring costs in the paper category. Therefore, both primary screeners are met. Outagamie's secondary score for the paper category is 5, requiring only one primary screener to be met. The economic demonstration is accepted.

Save

15. What watershed option was selected?

- (●) County project option. *Complete Section 5.*
- ( ) Binding, written agreement with the DNR to construct a project or implement a watershed plan. *Complete Section 4.*
- ( ) Binding, written agreement with another person that is approved by the DNR to construct a project or implement a watershed plan. *Complete Section 4.*

Section 4. Watershed Plan Review

16. MDV Plan Number: *Note: This is for tracking purposes. Contact Statewide Phosphorus Implementation Coordinator for the plan number.*	_____
17. Did the point source complete Form 3200-148?	( ) Yes ( ) No
18. Is the project area in the same HUC 8 watershed as the point of discharge?	( ) Yes ( ) No. *STOP- Watershed plan must be updated.*
19. What is the annual offset required? *See Section 2.03 of the MDV implementation guidance. If this value is different from the offset target provided in form 3200-148, the watershed plan should be amended.*	_____
20. Does the plan ensure that the annual load is offset annually?	( ) Yes ( ) No. *STOP- Watershed plan must be updated.*

21. Are projects occurring on land owned/operated by a CAFO or within a permitted MS4 boundary?

- ( ) Yes. *Work with appropriate DNR staff to ensure projects are not working towards other permit compliance.*
- ( ) No.

22. Are other funding sources being used as part of the MDV watershed project?

- ( ) Yes. *Work with appropriate DNR staff to ensure that funding sources can be appropriately used in the plan area.*
- ( ) No.

23. Do you have any concerns about the watershed project? *Note: Coordinate with other DNR staff as appropriate.*	( ) Yes. *STOP- Watershed plan must be updated.* ( ) No.

Comments:

Section 5. Payment to the County(ies)

24. At this time, the appropriate per pound payment is: $ 58.85

See "Payment Calculator" document at \\central\water\WQWT_PROJECTS\WY_CW_Phosphorus\MDV.

Section 6. Determination

Based on the available information, the MDV application is:

- (●) Approved
- ( ) Request for more information
- ( ) Denied

Save

Additional Justification (if needed):
The Thilmany Mill will need to identify and work towards addressing barriers to affordable treatment (flocculating clarification) and/or water quality trading during the upcoming permit term.

Certification

Preparer Name	Title
Matt Claucherty	Water Resources Management Specialist

Signature of Preparer: Sign | Clear — Matthew Claucherty

Date: 12/5/2022

A copy of this completed checklist should be saved in SWAMP, and a notification of the decision should be sent to the Phosphorus Implementation Coordinator.

Submit to Coordinator...

Save

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
101 S. Webster Street
Box 7921
Madison WI 53707-7921

Tony Evers, Governor
Preston D. Cole, Secretary
Telephone 608-266-2621
FAX 608-267-3579
TTY Access via relay - 711

12/5/2022

Lee Hammen, Mill Manager
600 Thilmany Road
Kaukauna, WI 54130

Subject: Conditional approval of a multi-discharger phosphorus variance
Receiving Stream: Fox River in Outagamie County
Permittee: Ahlstrom Munksjo NA Specialty Solutions LLC , WPDES WI-0000825

Dear Mr. Hammen:

In accordance with s. 283.16 of the Wisconsin Statutes, you have requested coverage under Wisconsin's multi-discharger phosphorus variance for the Thilmany Mill in an application dated 6/28/2021. Wisconsin's multi-discharger phosphorus variance was approved by EPA on February 6, 2017. Coverage under the multi-discharger phosphorus variance may only be granted to an existing source that demonstrates a major facility upgrade is necessary to achieve phosphorus compliance and the upgrade will result in economic hardship as defined in the federally approved variance. The water quality criterion for which you are seeking a variance is contained in s. NR 102.06, Wis. Adm. Code.

After review of the application materials, the Department is tentatively approving coverage under the phosphorus multi-discharger variance because the applicant has demonstrated that a major facility upgrade would be required to comply with the phosphorus water quality based effluent limitation, and the applicant meets the economic hardship eligibility criteria delineated in the federally approved variance. In addition, the permitted facility has agreed to comply with the interim limitations that will be included in the WPDES permit, and has agreed to reduce the amount of phosphorus entering surface waters by making payments to the counties pursuant to s. 283.16(6)(b)1., Wis. Stats.

Please note that the reissued permit will contain phosphorus optimization requirements pursuant to s. 283.16(6)(a), Wis. Stats. Because the current treatment process is very close to meeting TMDL-based phosphorus limits, the Department expects Thilmany Mill to work to overcome barriers to using existing treatment to achieve these limits as part of the aforementioned optimization requirement.

Public comment on this decision will be solicited at the time of permit reissuance after which a final decision will be made. The Department appreciates your attention and interest in Wisconsin's multi-discharger phosphorus variance. Should you have further questions regarding this matter, please contact me at (608) 400 – 5596 or by email at matthew.claucherty@wisconsin.gov.

Sincerely,

Matt Claucherty, MDV Point Source Coordinator
Bureau of Water Quality

e-cc Heath Hoffmann, Thilmany Mill
Amanda Perdzock, WDNR
Barti Oumarou, WDNR
Tim Elkins, EPA Region 5
Sydney Weiss, EPA Region 5
Micah Bennett, EPA Region 5