Permit Fact Sheet

General Information

Permit Number:	WI-0027189-08-0
Permittee Name:	Manitowoc Public Utilities
Mailing Address:	1303 South 8th Street, Manitowoc, WI 54221
Facility Address	Power Plant: 701 Columbus Street, Manitowoc, WI 54221 Water Treatment Plant: 1303 South 8th Street, Manitowoc, WI 54221
Discharge Location:	Outfall 003 discharges to Lake Michigan 405 feet south of Columbus Street Outfall 004 discharges to Lake Michigan 415 feet south of Columbus Street Outfall 009 discharges to Lake Michigan 90 feet south of Columbus Street Outfall 010 discharges from various intake wet well locations along the shore of Lake Michigan
Receiving Water:	Lake Michigan (Water Body Identification Code number 20) in Manitowoc County
StreamFlow ($Q_{7,10}$):	N/A - A 10:1 dilution factor for a lake discharge is used in deriving effluent limits, where applicable
Stream Classification (Designated Uses):	Cold water aquatic life community, Great Lakes, recreation, and public water supply
Discharge Type:	Outfall 003 – Non-continuous Outfall 004 – Non-continuous Outfall 009 – Continuous Outfall 010 – Non-continuous

Facility Description

Manitowoc Public Utilities ("MPU") is a municipal electric, steam, broadband and water utility that operates three steam turbine-generator units that are fueled by coal, petroleum coke, or paper pellets, one natural gas auxiliary boiler, and one diesel generator unit that can burn fuel oil or natural gas and a membrane filtration water treatment plant in the City of Manitowoc. Noncontact cooling water, condenser cooling waters, , backwash water and other wastewaters are discharged via several outfalls located on the shore of Lake Michigan within 1000 feet of each other. The MPU uses Lake Michigan as its source of cooling water and non-contact cooling water (NCCW) for the Power Plant and for the raw water supply to the water treatment facility which are supplied by a common intake system. Sanitary wastewater, traveling screen washwater, clean-in-place wastewater from the water treatment plant, boiler blowdown, carbon filter backwash, reverse osmosis reject, demineralizer wastewater, and miscellaneous other wastewater are directed to the sanitary sewer system. Boiler ash is handled dry and is loaded into trucks for off-site treatment and/or disposal. The facility also has the capability to transport dry ash by rail.

Runoff from the coal and petroleum coke piles is collected in an isolated shore well and flows to a settling tank in the Power Plant pump house. After the settling tank, the wastewater is treated trough a filter system and discharged to Lake Michigan via Outfall 003. Settled solids are vacuumed from the settling tanks and processed by a contractor on an as needed basis and processed.

Zebra mussel treatment of the Water Plant pump house wet well is normally performed on an infrequent basis. After isolating the wet wells, the plant pumps down the well and discharges the lake water as outfall 010. Contractors then enter the well and power wash the facility to remove the mussels. The contractor then vacuums up the debris and hauls the material to a landfill for disposal. After isolating the wet wells, the alternate procedure is for the Water Plant to add sodium bisulfite. Five to seven days later, fresh water is added to the wet wells until the oxygen content of the water is above 5 mg/L. The contents of the wet wells are then pumped to Lake Michigan. A screen box is used to remove any debris. The discharge flows over the shore before reaching Lake Michigan. MPU's current permit identifies this discharge as Outfall 010. Once emptied, the wet wells are scraped and power washed with potable water. A vacuum truck removes all debris for landfill disposal and the rinse water is discharged to Outfall 010.

Changes from the previous permit have been highlighted in grey.

Substantial Compliance Determination

Enforcement During Last Permit:

After a desk top review of all discharge monitoring reports, CMARs, compliance schedule items, and a site visit on 10/17/2023, this facility has been found to be in substantial compliance with their current permit.

Compliance determination entered by Trevor Moen, Wastewater Engineer on October 19th, 2023.

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/sample Contents and Treatment Description (as applicable)**
702	N/A	PLANT RAW WATER: At Sampling Point 702, the permittee shall collect representative samples of the combined Lake Michigan intake water from intakes RWSP1, RWPS2, RWPS3 South Rock Crib, and RWPS3 North Rock Crib prior to being used for cooling purposes at any combination of Condensers 5 and 6, Generators 5 and 6, Turbines 5 and 6, Boiler 8, or Unit 9 noncontact cooling water system and discharged via Outfall 004 or Outfall 009. The permittee shall calculate the combined intake flow rate of RWSP1, RWPS2, RWPS3 South Rock Crib, and RWPS3 North Rock Crib prior use for as cooling water. The permittee shall continuously measure temperature on the intake water from the inlet to Unit 9 NCCW system.
901	75 MGD Maximum Design Intake[1] 24.13 MGD Average Intake[1]	INTAKE: Raw water pump system 1 (RWPS1). This intake feeds water to Raw Water Station 1 Well No. 2 prior to being treated at the water treatment facility or used for cooling purposes at the power plant. The permittee shall estimate the intake flow rate by the number of pumps used, pump capacities, and pump run times on a given day.
902	56 MGD Maximum Design Intake[1] 35.98 MGD Average Intake[1]	INTAKE: Raw water pump system 2 (RWPS2). This intake feeds water to Raw Water Station 2 prior to being treated at the water treatment facility or used for cooling purposes at the power plant. The permittee shall estimate the intake flow rate by the number of

[1] Data submitted on "Wisconsin Pollutant Discharge Elimination System (WPDES) Wastewater Discharge Individual Permit Application" (Form 3400-178) by Manitowoc Public Utilities

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/sample Contents and Treatment Description (as applicable)**
		pumps used, pump capacities, and pump run times on a given day.
903	16.49 MGD Maximum Day[2] 12.40 MGD Maximum 7-day Average[2] 9.65 MGD Maximum 30-day Average[2] 1.75 MGD Maximum Annual Average[2]	INTAKE: Raw water pump system 3 (RWPS3) South Rock Crib. This intake is one of two rock cribs that serves the RWPS3. The South Rock Crib uses a 48 inch pipe. Intake located approximately 2,200 feet offshore.This intake feeds water to Power Plant Wet Wells 2, 3, and 4 and used for cooling purposes at the power plant. The permittee shall estimate the intake flow rate by the number of pumps used, pump capacities, and pump run times on a given day.
904	12.69 MGD Maximum Day[2] 12.40 MGD Maximum 7-day Average[2] 9.65 MGD Maximum 30-day Average[2] 1.75 MGD Maximum Annual Average[2]	INTAKE: Raw water pump system 3 (RWPS3) North Rock Crib. This intake is one of two rock cribs that serves the RWPS3. The North Rock Crib uses a 36 inch pipe. Intake located approximately 1,700 feet offshore.This intake feeds water to Power Plant Wet Wells 2, 3, and 4 and used for cooling purposes at the power plant. The permittee shall estimate the intake flow rate by the number of pumps used, pump capacities, and pump run times on a given day.
905	28,800 gpd Maximum Design Intake[1] 12 gpd Average Intake[1]	INTAKE: Former C. Reiss coal dock purchased July 17, 2015. Intake used for fugitive dust control only. Per EPA because no water is used for cooling, requirements for cooling water intake structures is not required. State statute is applicable. The permittee shall estimate the intake flow rate by the number of pumps used, pump capacities, and pump run times on a given day.
003	0.111 MGD Maximum Day[1] 0.063 MGD Maximum 7-day Average[1] 0.043 Maximum 30-day Average[1] 0.023 Maximum Annual Average[1]	EFFLUENT: At sampling Point 003, the permittee shall collect representative grab samples of the treated fuel pile storm water runoff and dust control water from the fuel (petroleum coke) storage pile that is collected and treated by a settling tank and filter system prior to discharging to Lake Michigan via Outfall 003. The permittee shall estimate the flow rate of the filter system from treating petroleum coke runoff by the pump capacity and pump run time of the sump pump in the wet well that feeds the settling tank and filter prior to discharged to Lake Michigan via Outfall 003.
004	0.076 MGD Maximum Day[1] 0.076 MGD Maximum 7-day Average[1] 0.076 MGD Maximum 30-day Average[1] 0.046 MGD Maximum Annual	EFFLUENT: At Sampling Point 004, the permittee shall collect representative grab samples of the noncontact cooling waters from air compressors, boiler, and turbine equipment cooling treated with an oil/water separator from the sampling port of the oil/water separator prior to being discharged to Outfall 004. The permittee shall measure the flow rate with a continuous flow recording device prior to being treated by an oil/water separator and discharging via Outfall 004 to Lake Michigan. For Whole Effluent Toxicity

[2] Calculated from data submitted on the eDMRs between December 1st 2018 and November 30th 2023

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/sample Contents and Treatment Description (as applicable)**
	Average[1]	Testing, the permittee shall collect a minimum of three, equal volume grab samples at approximately equal intervals of time over a 24-hour period and composite those samples.
009	89.6 MGD Maximum Day[1] 88.4 MGD Maximum 7-day Average[1] 74.2 MGD Maximum 30-day Average[1] 52.2 MGD Maximum Annual Average[1]	EFFLUENT: At Sampling Point 009, the permittee shall collect representative grab samples of the combined microfiltration backwash, once-through cooling waters from Condensers 5 and 6, and noncontact cooling waters from Unit 9 noncontact cooling system and Generators 5 and 6 after mixing, and prior to discharging to Lake Michigan via Outfall 009.The permittee shall estimate the flow rate based on pump pressure and pump run times. The permittee shall continuously measure from the outlet prior to being discharged via Outfall 009. The permittee shall For Whole Effluent Toxicity Testing, the permittee shall collect a minimum of three, equal volume grab samples at approximately equal intervals of time over a 24-hour period and composite those samples.
010	0.106 MGD Maximum Day[1] 0.016 MGD Maximum 7-day Average[1] 0.004 MGD Maximum 30-day Average[1] 0.0003 MGD Maximum Annual Average[1]	EFFLUENT: At Sampling Point 010, the permittee shall collect representative grab composite samples of untreated Lake Michigan water that is pumped or drained from the Raw Water Stations 1 and 2 for pump house shore well cleaning and zebra mussel control from the discharge catch basin prior to being discharged to Lake Michigan via Outfall 010. The permittee shall estimate the flow rate of untreated Lake Michigan Water for pump house shore well cleaning and/or zebra mussel control by the known volume of the wet wells, pump capacities, and pump run times.
105	1.717 MGD Maximum Day[2] 1.614 MGD Maximum 7-day Average[2] 1.530 MGD Maximum 30-day Average[2] 1.459 MGD Maximum Annual Average[2]	BACKWASH: At Sampling Point 105, the permittee shall collect representative grab samples of the strainer and microfilter backwash waters from a port hole on the top of the microfiltration backwash basin prior to combining with once-through condenser cooling water from Sampling Point 109 and discharging to Lake Michigan via Outfall 009.The permittee shall estimate the flow rate of the microfiltration backwash by taking the difference in the intake flow rate and filtered water flow rate.
109	90.90 MGD Maximum Day[2] 89.12 MGD Maximum 7-day Average[2] 82.80 MGD Maximum 30-day Average[2] 55.96 MGD Maximum Annual Average[2]	IN PLANT: At Sampling Point 109, the permittee shall continuously measure the temperature of the once-through cooling waters from Condensers 5 and 6, and noncontact cooling waters from Unit 9 noncontact cooling water system and Generators 5 and 9 after mixing, but prior to combining with microfilter backwash from Sampling Point 105 and discharging to Lake Michigan via Outfall 009.The permittee shall estimate the flow rate of combined once through condenser cooling water from Condensers 5 and 6, and noncontact cooling water from Unit 9 noncontact cooling water system and Generators 5 and 6 based on pump pressure and pump run times.

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/sample Contents and Treatment Description (as applicable)**
110	N/A	FIELD BLANK: At Sampling Point 110, the permittee shall collect one field blank on the same day that all other mercury samples collected. The permittee shall report the field blank concentrations when reporting mercury sample results.

1 Influent – Cooling Water Intake Structure - Proposed Monitoring

Sample Point Number: 702- Power Plant Raw Water

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Calculated	
Temperature Average		deg F	Daily	Continuous	
Phosphorus, Total		mg/L	Monthly	Grab	Monitoring only from January 1, 2027 to December 31, 2027.
Arsenic, Total Recoverable		ug/L	Monthly	Grab	Monitoring only from January 1, 2027 to December 31, 2027.
Mercury, Total Recoverable		ng/L	Monthly	Grab	Monitoring only from January 1, 2027 to December 31, 2027. See Mercury Monitoring section for more details.

Changes from Previous Permit:

Phosphorus, Arsenic, and Mercury – Monthly monitoring added for one year

Explanation of Limits and Monitoring Requirements

Phosphorus, Arsenic, and Mercury

The Department is requiring that the permittee collect monthly samples that are representative of the intake water from the lake and have it analyzed for phosphorus, arsenic, and mercury. This sampling will help the permittee determine the intake phosphorus, arsenic, and mercury contributions to the effluent discharge.

Sample Point Number: 901- RWPS1

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Estimated	
Intake Water Used Exclusively For Cooling		% Flow	Annual	Calculated	

Changes from Previous Permit

Intake Water Used Exclusively For Cooling – Annual monitoring added

Cooling Water Intake Structure (CWIS): The Influent section includes the CWIS description, authorization for use, and BTA (Best Technology Available) determination. The permittee is authorized to use the cooling water intake structure which consists of the following:

- Location: In Lake Michigan 9,000 feet offshore (44°04'35.7"N, 87°37'17.7"W).
- Major Components: The intake consists of three inverted cones that extend 4 to 5 feet above the bottom of the lake. Each cone has a 11.5 foot diameter and is covered with grates made of 0.5 inch wide bars spaced 6-inches on center. The cones are connected to a 48-inch diameter pipe that conveys water to two pump wells
- Maximum Design Intake Flow (DIF): The maximum design intake flow (DIF) is **57** MGD (88.2 cfs). This is based upon the intake's pump capacity, not counting redundant or emergency pumps.
- Percent Used for Cooling: 80%

Explanation of Limits and Monitoring Requirements

Intake Water Used Exclusively for Cooling

s. NR 111.22(3), Wis. Adm. Code, requires the percentage of water used for cooling to be monitored on a daily basis or on a less frequent basis if daily monitoring is infeasible or overly burdensome. The department considers daily monitoring to be overly burdensome for this facility, so annual monitoring has been included instead.

Future BTA

The above determination is a final BTA determination. BTA determinations for entrainment and impingement mortality at cooling water intake structures will be made in each permit reissuance, 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.

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.

Sample Point Number: 902- RWPS2

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Estimated	
Intake Water Used Exclusively For Cooling		% Flow	Annual	Calculated	

Changes from Previous Permit

Intake Water Used Exclusively For Cooling – Annual monitoring added

Cooling Water Intake Structure (CWIS): The Influent section includes the CWIS description, authorization for use, and BTA (Best Technology Available) determination. The permittee is authorized to use the cooling water intake structure which consists of the following:

- Location: In Lake Michigan 4,000 feet offshore (44°04'43.7"N, 87°38'26.7"W)
- Major Components: The intake is made of two cylindrical wedgewire screens with 3/8-inch-wide slots. Each screen has a 60-inch diameter and are 17.45 feet long. After the screens the water passes through a 60-inch diameter pipe.
- Maximum Design Intake Flow (DIF): The maximum design intake flow (DIF) is 56 MGD (86.6 cfs). This is based upon the intake's pump capacity, not counting redundant or emergency pumps.
- Percent Used for Cooling: 80%

Explanation of Limits and Monitoring Requirements

Intake Water Used Exclusively for Cooling

s. NR 111.22(3), Wis. Adm. Code, requires the percentage of water used for cooling to be monitored on a daily basis or on a less frequent basis if daily monitoring is infeasible or overly burdensome. The department considers daily monitoring to be overly burdensome for this facility, so annual monitoring has been included instead.

Future BTA

The above determination is a final BTA determination. BTA determinations for entrainment and impingement mortality at cooling water intake structures will be made in each permit reissuance, 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.

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.

Sample Point Number: 903- RWPS3 South Rock Crib

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Estimated	
Intake Water Used Exclusively For Cooling		% Flow	Annual	Calculated	

Changes from Previous Permit

Intake Water Used Exclusively For Cooling – Annual monitoring added

Cooling Water Intake Structure (CWIS): The Influent section includes the CWIS description, authorization for use, and BTA (Best Technology Available) determination. The permittee is authorized to use the cooling water intake structure which consists of the following:

- Location: In Lake Michigan 2,200 feet offshore (44°04'43.9"N, 87°38'54.0"W).
- Major Components: This intake has a 40 foot square footprint and consists of lattice made of 12-inch by 12-inch lumber filled with “one-man” stones.
- Maximum Design Intake Flow (DIF): The maximum design intake flow (DIF) is **26** MGD (40.2 cfs). This is based upon the intake’s pump capacity, not counting redundant or emergency pumps.

Explanation of Limits and Monitoring Requirements

Intake Water Used Exclusively for Cooling

s. NR 111.22(3), Wis. Adm. Code, requires the percentage of water used for cooling to be monitored on a daily basis or on a less frequent basis if daily monitoring is infeasible or overly burdensome. The department considers daily monitoring to be overly burdensome for this facility, so annual monitoring has been included instead.

Future BTA

The above determination is a final BTA determination. BTA determinations for entrainment and impingement mortality at cooling water intake structures will be made in each permit reissuance, 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.

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.

Sample Point Number: 904- RWPS3 North Rock Crib

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Estimated	
Intake Water Used Exclusively For Cooling		% Flow	Annual	Calculated	

Changes from Previous Permit

Intake Water Used Exclusively For Cooling – Annual monitoring added

Cooling Water Intake Structure (CWIS): The Influent section includes the CWIS description, authorization for use, and BTA (Best Technology Available) determination. The permittee is authorized to use the cooling water intake structure which consists of the following:

- Location: In Lake Michigan 1,700 feet offshore (44°04'45.6"N, 87°39'01.0"W).
- Major Components: This intake has an octagonal footprint with alternating sides of 24- and 8-feet ands consists of stones confined within 120 pilings with 2 inches in between each piling.
- Maximum Design Intake Flow (DIF): The maximum design intake flow (DIF) is **26** MGD (40.2 cfs). This is based upon the intake's pump capacity, not counting redundant or emergency pumps.

Explanation of Limits and Monitoring Requirements

Intake Water Used Exclusively for Cooling

s. NR 111.22(3), Wis. Adm. Code, requires the percentage of water used for cooling to be monitored on a daily basis or on a less frequent basis if daily monitoring is infeasible or overly burdensome. The department considers daily monitoring to be overly burdensome for this facility, so annual monitoring has been included instead.

Future BTA

The above determination is a final BTA determination. BTA determinations for entrainment and impingement mortality at cooling water intake structures will be made in each permit reissuance, 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.

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.

Sample Point Number: 905- MPU North Dock

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Per Occurrence	Estimated	

Changes from Previous Permit:

The department has determined that no changes are necessary.

Water Intake Structure: The Influent section includes the water intake structure description, authorization for use, and BTA (Best Technology Available) determination. The permittee is authorized to use the water intake structure which consists of the following:

Explanation of Limits and Monitoring Requirements

Flow Rate

Flow rate is required to be monitored to allow the evaluation of the usage of MPU North Dock.

Water Intake Structure:

Since none of the water withdrawn through the MPU North Dock is used for cooling a best professional judgment BTA determinations was made using the Department's 2020 *Guidance for Evaluating Intake Structures Using Best Professional Judgment* instead of a BTA determination under the requirements of ch. NR 111. For existing intake structures, the guidance advises that intakes deemed BTA should fulfill at least one of the following eight criteria:

- **Each water intake structure has a maximum design intake velocity of 0.5 feet per second (fps) OR a maximum actual intake velocity of 0.5 fps, demonstrated via measured or calculated values which show the maximum intake velocity as water passes through the intake system, measured perpendicular to the opening, does not exceed 0.5 fps at any point up until the first screen of mesh size 3/8" (or equivalent) or less.**
- The facility operates a closed-cycle recirculating system that only requires make-up water with > 3 cycles of concentration on at least a daily basis. Cycles of concentration can be measured as the ratio of chloride levels in the recirculated water or blowdown relative to the chloride levels in the source water, or makeup water; or the

make-up water volume divided by the blowdown volume (provided there aren't other water losses); or the blowdown water conductivity divided by the make-up water conductivity.

- The facility operates an intake structure that minimizes impingement rates by nature of its location (e.g. offshore velocity cap).
- The facility employs a system of technologies (e.g. wedge-wire screens, barrier nets; acoustic, light, or pH deterrent systems; variable speed pumps, etc.) that minimize impingement mortality rates.
- The facility operates a modified traveling screen in an optimal manner that does not promote re-impingement or predation of returned organisms.
- The facility's intake withdraws water at > 0.25 fps less than or equal to 16% of the time.
- There is data indicating that the impingement mortality rate has been/will be reduced 80-95% compared to a once-through cooling system with 3/8" traveling screens;
- There is biological data that affirmatively demonstrates that: 1) the source water body does not include threatened or endangered species in the vicinity of the intake, and 2) there are no aquatic life and water quality problems partly or solely due to the presence or operation of the intake structure.

And at least one of the following five criteria:

- **The total water withdrawn (actual intake flow) is ≤ 5% of the mean annual flow of the river on which the intake is located (if on a river or stream) OR the total quantity of the water withdrawn is restricted to a level necessary to maintain the natural thermal stratification or turnover patterns (where present) except in cases where the disruption is beneficial (if on a lake or reservoir)**
- The facility operates at < 8% capacity utilization rate (with pumps turned off or, if variable frequency drives exist, down substantially during periods of non-operation) or at full capacity only for portions of days during a few months or less on an annual basis. If located in a spawning area, the period of water intake operation should not correspond with times when spawning, peak egg/larval abundance, or larval recruitment is occurring (depending on species present, usually between April – October).
- The facility operates a closed-cycle recirculating system that only requires make-up water with ≥ 3 cycles of concentration on at least a daily basis. Cycles of concentration can be measured as the ratio of chloride levels in the recirculated water or blowdown relative to the chloride levels in the source water, or makeup water; or the make-up water volume divided by the blowdown volume (provided there aren't other water loses); or the blowdown water conductivity divided by the make-up water conductivity.
- The facility utilizes other means such as variable speed pumps, unit retirements, etc. to decrease entrainment rates by greater than or equal to 60% compared to a once-through cooling system with 3/8" traveling screens. Flow rate may be used as a surrogate for entrainment rates when determining percent reduction.
- There is biological data that affirmatively demonstrates that: 1) the source water body does not include threatened or endangered species in the vicinity of the intake, 2) there are no aquatic life and water quality problems partly or solely due to the presence or operation of the intake structure, and 3) the department biologist concurs that operation of the intake during periods of spawning, peak egg/larval abundance, and larval recruitment will not substantially impact populations or prey bases for the fishery.

And the following criteria:

- **The facility-wide design intake flow (DIF) for all water intake structures is ≤ 2 MGD (all intake water, cooling and non-cooling, is included in the determination of whether this DIF threshold is met) OR < 25% of the total water withdrawn is used exclusively for cooling purposes (water from a public water system, treated effluents, process water, gray water, wastewater, reclaimed water, or water used in a manufacturing process before or after it is used for cooling is not considered cooling water for the purposes of this determination) (The facility uses less than 25% of the water withdrawn exclusively for cooling purposes)**

Since the existing MPU North Dock intake structure meets the bolded criteria above the department has determined that the existing intake is BTA for minimizing entrainment and impingement mortality.

General Intake Requirements

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. 40 CFR §125.98 (b) (1) requires the inclusion of this provision in all permits subject to 316(b) requirements. 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

Sample Point Number: 105- MICROFILTER BACKWASH

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Total Daily	
Suspended Solids, Total	Daily Max	40 mg/L	Weekly	Grab	
Suspended Solids, Total	Monthly Avg	40 mg/L	Weekly	Grab	
pH (Maximum)	Daily Max	9.0 su	Monthly	Grab	
pH (Minimum)	Daily Min	6.0 su	Monthly	Grab	

Changes from Previous Permit:

The department has determined that no changes are necessary.

Explanation of Limits and Monitoring Requirements

Sample Point 105 represents strainer and microfilter backwash waters from the Water Plant CMF and SMF units. Each of the 14 CMF microfiltration units and each of the 5 SMF microfiltration units have a magnetic flow meter to measure filtered water flow. The water meters continuously monitor and totalize flow and are automatically read every day. When the settling/storage tank's under drain is open, the entire backwash flow is discharge to the sanitary sewer and no flow is reported for Sample Point 105. To comply with TSS and pH monitoring requirements, MPU manually collects samples of backwash water from the settling/storage tank's decant line.

Phosphorus

The operation of the microfilter backwash system uses chemicals that may contain phosphorus, so monitoring for phosphorus is included in this permit.

TSS

s. NR 205.07(3)(a), Wis. Adm. Code, prohibits the discharge of solids, sludges, filter backwash or other pollutants removed from or resulting from treatment or control of wastewaters or intake waters to waters of the state. The TSS limit is included to ensure that this requirement is met.

Sample Point Number: 109- Combined Cooling Waters

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Total Daily	
Temperature Average		deg F	Daily	Continuous	
Temperature Maximum		deg F	Daily	Continuous	

Changes from Previous Permit:

The department has determined that no changes are necessary.

Explanation of Limits and Monitoring Requirements

Sample Point 109 represents the discharge of once-through condenser cooling water from Condensers 4, 5, 6 and 9 and noncontact cooling water from Generators 4, 5, 6 and 9. MPU continuously monitors and records the temperature of the combined cooling water discharge. The primary discharge temperature probe is located in the discharge outlet and the backup temperature probe is located in the condenser cooling water outlet pipe downstream from Condensers but upstream of a supply connection to the Water Plant's pump house and the connection for Water Plant microfiltration

backwash discharge. MPU calculates the flow rate of the cooling water from pump pressure and time of operation data. MPU continuously monitors and records pump header pressure. The pressure probe is located just downstream from the Power Plant's #4 wet well.

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	Monthly	Blank	Monitoring only from January 1, 2027 to December 31, 2027.

Changes from Previous Permit:

Sample Point – Sample point 110 added

Explanation of Limits and Monitoring Requirements

Mercury:

A field blank must be collected each day that a sample is collected for mercury. This mercury field blank fulfills the data quality requirements for ss. NR 106.145(9) and (10), Wis. Adm. Code.

3 Surface Water - Monitoring and Limitations

Sample Point Number: 003- Fuel Pile Runoff

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Per Occurrence	Estimated	
Suspended Solids, Total	Daily Max	50 mg/L	Per Occurrence	Grab	
pH Field	Daily Max	9.0 su	Quarterly	Grab	
pH Field	Daily Min	6.0 su	Quarterly	Grab	
Copper, Total Recoverable	Daily Max	43 ug/L	Quarterly	Grab	
Copper, Total Recoverable	Daily Max	0.047 lbs/day	Quarterly	Calculated	
Zinc, Total Recoverable	Daily Max	320 ug/L	Quarterly	Grab	
Zinc, Total Recoverable	Daily Max	0.35 lbs/day	Quarterly	Calculated	
Mercury, Total Recoverable		ng/L	Monthly	Grab	Monitoring only from January 1, 2027 to December 31, 2027.
Arsenic, Total Recoverable		ug/L	Monthly	Grab	Monitoring only from January 1, 2027 to December 31, 2027.
Phosphorus, Total		mg/L	Monthly	Grab	Monitoring only from January 1, 2027 to December 31, 2027.
PFOS		ng/L	Monthly	Grab	Monitoring only. See PFOS/PFOA Sampling and Reporting Requirements section below and PFOS/PFOA Minimization Plan Determination of Need section below and compliance schedule.
PFOA		ng/L	Monthly	Grab	Monitoring only. See PFOS/PFOA Sampling and Reporting Requirements

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					section below and PFOS/PFOA Minimization Plan Determination of Need section below and compliance schedule.

Changes from Previous Permit

Sample Point – Changed from in plant sample point 107 to effluent sample point 003

Flow Rate and TSS – Sample frequency changed from daily to per occurrence

pH – Daily maximum and minimum limits added

Copper and Zinc – Daily maximum mass limits added and frequency changed to quarterly

Mercury and Phosphorus – Sample frequency changed from quarterly to monthly

Explanation of Limits and Monitoring Requirements

Water Quality Based Limits

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated 4/14/2023 and updated on 12/19/2023 used for this reissuance.

Flow Rate and TSS

Outfall 003 is not a continuous discharge, so the flow rate and TSS monitoring requirements have been changed to per occurrence to more accurately reflect the operation of this outfall.

pH

s. NR 290.12(1)(a), Wis. Adm. Code, requires all discharges, except for once through cooling water, to have a pH within the range of 6.0 to 9.0.

Copper and Zinc

For antidegradation purposes a mass limit must be included when there are concentration limits for copper and zinc. The acute mass limitations are based on the concentration limits and the peak daily flow rate from the previous ten years in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

Mercury and Phosphorus

The sample frequency for mercury and phosphorus has been changed as part of this reissuance in order to ensure that enough data is collected to determine reasonable potential for the next permit term.

PFOS and PFOA

NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for industrial dischargers to be evaluated on a case-by-case basis to determine if monitoring is required pursuant to s. NR 106.98(2)(d), Wis. Adm. Code. The department evaluated the need for PFOS and PFOA monitoring taking into consideration industry type and other potential sources of PFOS or PFOA. Based on information available at the time the proposed permit was drafted, it was identified that the industrial discharger category may be a potential source of PFOS/PFOA. Therefore, monthly monitoring is included. The initial determination of need sampling shall be conducted for up to two years in

order to determine if the permitted discharge has the reasonable potential to cause or contribute to an exceedance of the PFOS or PFOA standards under s. NR 102.04(8)(d)1, Wis. Adm. Code.

Sample Point Number: 004- OIL/WATER SEPARATOR

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
Suspended Solids, Total	Daily Max	100 mg/L	Quarterly	Grab	
pH Field	Daily Max	9.0 su	Quarterly	Grab	
pH Field	Daily Min	6.0 su	Quarterly	Grab	
Phosphorus, Total		mg/L	Monthly	Grab	Monitoring only from January 1, 2027 to December 31, 2027.
Copper, Total Recoverable	Daily Max	40 ug/L	Quarterly	Grab	
Copper, Total Recoverable	Daily Max	0.055 lbs/day	Quarterly	Grab	
Temperature Maximum		deg F	Daily	Grab	Monitoring only from January 1, 2027 to December 31, 2027. Monitoring only required on days when discharge occurs.
Arsenic, Total Recoverable		ug/L	Monthly	Grab	Monitoring only from January 1, 2027 to December 31, 2027.
Mercury, Total Recoverable		ng/L	Monthly	Grab	Monitoring only from January 1, 2027 to December 31, 2027.
PFOS		ng/L	Monthly	Grab	Monitoring only. See PFOS/PFOA Sampling and Reporting Requirements section below and PFOS/PFOA Minimization Plan Determination of Need section below and compliance schedule.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
PFOA		ng/L	Monthly	Grab	Monitoring only. See PFOS/PFOA Sampling and Reporting Requirements section below and PFOS/PFOA Minimization Plan Determination of Need section below and compliance schedule.

Changes from Previous Permit

Sample Point – Name changed

Flow Rate – Sample type changed from calculated to continuous

TSS and pH – Quarterly grab samples added

Phosphorus, Arsenic, and Mercury – Monthly grab samples added for one year

Copper – Quarterly grab samples added for concentration and mass loading

Temperature – Daily grab samples added for one year

PFOS and PFOA – Monthly grab samples added

Explanation of Limits and Monitoring Requirements

Water Quality Based Limits and WET Requirements

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated 4/14/2023 and updated on 12/19/2023 used for this reissuance.

Phosphorous

Monthly monitoring for one year has been included in this reissuance to allow the department to determine if there is reasonable potential for a phosphorous limit at this outfall

Copper

A concentration limit for copper has been included in this reissuance due to the calculated average copper concentration in the effluent being greater than $1/5^{th}$ of the calculated daily maximum limit of 40 µg/L.

In addition a mass limit has been included in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

Temperature

The department has added the requirement for temperature monitoring in order to allow for an accurate determination of reasonable potential for the next reissuance.

Arsenic

An arsenic monitoring requirement has been included in this reissuance to allow the department to determine if there is reasonable potential for an arsenic limit at this outfall. This data is needed due to the department being unable to determine reasonable potential for this reissuance since the LOD used for Outfall 004 was not low enough for the department to determine reasonable potential.

Mercury

A mercury monitoring requirement has been included in this reissuance to allow the department to determine if there is reasonable potential for a mercury limit at this outfall. This data is needed due to the department being unable to determine reasonable potential for this reissuance since the LOD used for Outfall 004 was 66 ng/L which is greater than the calculated limit of 1.3 ng/L.

PFOS and PFOA

NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for industrial dischargers to be evaluated on a case-by-case basis to determine if monitoring is required pursuant to s. NR 106.98(2)(d), Wis. Adm. Code. The department evaluated the need for PFOS and PFOA monitoring taking into consideration industry type and other potential sources of PFOS or PFOA. Based on information available at the time the proposed permit was drafted, it was identified that the industrial discharger category may be a potential source of PFOS/PFOA. Therefore, monthly monitoring is included. The initial determination of need sampling shall be conducted for up to two years in order to determine if the permitted discharge has the reasonable potential to cause or contribute to an exceedance of the PFOS or PFOA standards under s. NR 102.04(8)(d)1, Wis. Adm. Code.

Sample Point Number: 009- COOLING WATER & BACKWASH

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Calculated	
BOD5, Total		mg/L	Per Occurrence	Grab Comp	
Dissolved Oxygen	Daily Min	5.0 mg/L	Per Occurrence	Grab Comp	
Chlorine, Total Residual	Daily Max	38 ug/L	Per Occurrence	Grab Comp	
Copper, Total Recoverable		ug/L	Monthly	Grab	Monitoring only from January 1, 2027 to December 31, 2027.
Arsenic, Total Recoverable		ug/L	Monthly	Grab	Monitoring only from January 1, 2027 to December 31, 2027.
Mercury, Total Recoverable		ng/L	Monthly	Grab	Monitoring only from January 1, 2027 to December 31, 2027.
Temperature Maximum		deg F	Daily	Grab	Monitoring only from January 1, 2027 to December 31, 2027.
Acute WET		TUa	See Listed Qtr(s)	Grab Comp	See WET testing section below for listed quarters and more detail.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Chronic WET		TUc	See Listed Qtr(s)	Grab Comp	See WET testing section below for listed quarters and more detail.
PFOS		ng/L	Monthly	Grab	Monthly monitoring only required in the first two years after the effective date of this reissuance.
PFOA		ng/L	Monthly	Grab	Monthly monitoring only required in the first two years after the effective date of this reissuance.

Changes from Previous Permit

Acute and Chronic WET – Monitoring added

PFOS and PFOA – Monthly monitoring added

Temperature – Daily monitoring added

Arsenic and Mercury – Monthly monitoring added

Explanation of Limits and Monitoring Requirements

Water Quality Based Limits and WET Requirements

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated 4/14/2023 and updated on 12/19/2023 used for this reissuance.

Arsenic

An arsenic monitoring requirement has been included in this reissuance to allow the department to determine if there is reasonable potential for an arsenic limit at this outfall. This data is needed due to the department being unable to determine reasonable potential for this reissuance since the LOD used for Outfall 004 was not low enough for the department to determine reasonable potential.

Mercury

A mercury monitoring requirement has been included in this reissuance to allow the department to determine if there is reasonable potential for a mercury limit at this outfall. This data is needed due to the department being unable to determine reasonable potential for this reissuance since the LOD used for Outfall 009 was 66 ng/L which is greater than the calculated limit of 1.3 ng/L.

PFOS and PFOA

NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for industrial dischargers to be evaluated on a case-by-case basis to determine if monitoring is required pursuant to s. NR 106.98(2)(d), Wis. Adm. Code. The department evaluated the need for PFOS and PFOA monitoring taking into consideration industry type and other potential sources of PFOS or PFOA. Based on information available at the time the proposed permit was drafted, it was identified that the industrial discharger category may be a potential source of PFOS/PFOA. Therefore, monthly monitoring is included. The initial determination of need sampling shall be conducted for up to two years in

order to determine if the permitted discharge has the reasonable potential to cause or contribute to an exceedance of the PFOS or PFOA standards under s. NR 102.04(8)(d)1, Wis. Adm. Code.

WHOLE EFFLUENT TOXICITY

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

Tests required in: October 1st – December 31st, 2024, July 1st – September 30th, 2025, April 1st – June 30th, 2026, January 1st – March 31st, 2027

Sample Point Number: 010- RWPS WET WELLS

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Per Occurrence	Estimated	Monitor the total daily flow rate per discharge occurrence.
BOD5, Total	Daily Max	30 mg/L	Per Occurrence	Grab Comp	Monitoring required and limits apply only when controlling Zebra Mussels at this outfall.
Dissolved Oxygen	Daily Min	5.0 mg/L	Per Occurrence	Grab Comp	Monitoring required and limits apply only when controlling Zebra Mussels at this outfall.
Suspended Solids, Total		mg/L	Per Occurrence	Grab Comp	Monitoring only required when controlling Zebra Mussels at this outfall.
Chlorine, Total Residual	Daily Max	38 ug/L	Per Occurrence	Grab Comp	Monitoring required and limits apply only when controlling Zebra Mussels at this outfall.

Changes from Previous Permit

The department has determined that no changes are necessary.

Explanation of Limits and Monitoring Requirements

Water Quality Based Limits and WET Requirements

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated 4/14/2023 and updated on 12/19/2023 used for this reissuance.

4 Schedules

4.1 Impingement Mortality BTA

Schedule to meet the selected impingement mortality BTA option of a 0.5 fps maximum design intake velocity.

Required Action	Due Date
Compliance Option: If the permittee has chosen to move forward with a different option of compliance with the impingement mortality BTA standards the permittee must inform the department by this date.	04/01/2025
Plans and Specifications: If the chosen compliance option involves a modification to the existing CWIS, the permittee must submit plans and specifications for the chosen option of compliance with the impingement mortality BTA standards by this date.	04/01/2026
Progress Report: Submit a report detailing the changes made so far as well as a timeline of any further changes that need to be made to the CWIS.	04/01/2027
Construction: If construction was deemed necessary in order to comply with the IM BTA determination, the permittee shall complete construction by this due date. This is also the date when compliance with the IM BTA standards must start being met.	04/01/2028

4.2 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.	04/01/2025
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	04/01/2026

action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit.	

4.3 Annual Certification Statements and Reports for Intake Structure

Submit an annual certification statement and report by January 31st of each year as specified by Section 1.3.3.1, Annual Certification Statement and Report, in accordance with the following schedule.

Required Action	Due Date
Submit Annual Certification Statement and Report #1: 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.	01/31/2025
Submit Annual Certification Statement and Report #2: Submit a second annual certification statement as defined above.	01/31/2026
Submit Annual Certification Statement and Report #3: Submit a third annual certification statement as defined above.	01/31/2027
Submit Annual Certification Statement and Report #4: Submit a fourth annual certification statement as defined above.	01/31/2028
Submit Annual Certification Statement and Report #5: Submit a fifth annual certification statement as defined above.	01/31/2029
Ongoing Annual Certification Statements and Reports: Continue to submit Annual Certification Statements and Reports until permit reissuance has been completed.	

Explanation of Schedules

Impingement Mortality BTA Schedule

The department has determined that the only CWIS that is currently BTA for achieving the maximum reduction in impingement mortality is the RWPS 2 CWIS, therefore a schedule is being included to allow MPU sufficient time to make any necessary changes to bring the other intakes into compliance with the chosen impingement mortality BTA standard.

PFOS/PFOA Minimization Plan Determination of Need

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

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

Annual Certification Statements and Reports for Intake Structure

Pursuant to s. NR 111.15(1)(c) the permittee must submit an annual certification statement and report on their cooling water intake structure.

Other Comments:

Enter Comments

Attachments:

Attachment #1: Water Quality Based Effluent Limits

Attachment #2: Cooling Water Intake Structure Best Technology Available Determination

Expiration Date:

06/30/2029

Prepared By: Sawyer Hanson Wastewater Engineer **Date: Enter Date**

Notice of reissuance was published in the [Enter name of publication] , [Enter address of publication] .

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 04/14/2023 – updated 04/16/2024 in response to facility comments

TO: Sawyer Hanson – WY/3

FROM: Nicole Krueger – SER Nicole Krueger

SUBJECT: Water Quality-Based Effluent Limitations for Manitowoc Public Utilities
WPDES Permit No. WI-0027189-08

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 Manitowoc Public Utilities in Manitowoc County. This industrial facility discharges to Lake Michigan. The evaluation of the permit recommendations is discussed in more detail in the attached report.

The following WPDES permit recommendations are made on a chemical-specific basis:

Sample Point 107 (Outfall 003) – Runoff Settling Tank

Parameter	Daily Maximum	Footnotes
Flow Rate		1,2
Total Suspended Solids (TSS)	50 mg/L	1
Arsenic		2
Mercury		1,2
Phosphorus		3
Copper	43 µg/L 0.047 lbs/day	
Zinc	320 µg/L 0.35 lbs/day	
PFOS and PFOA		4

Outfall 004 – NCCW & Oil/water Separator (zebra mussel control)

Parameter	Daily Maximum	Daily Minimum	Footnotes
Flow Rate			1,2
Biological Oxygen Demand (BOD_5)			1,2
Dissolved Oxygen		5.0 mg/L	1
Residual Chlorine	38 µg/L		1
Phosphorus			3
Copper	40 µg/L 0.055 lbs/day		
Temperature			2
Arsenic			2
Mercury			2
PFOS and PFOA			4

Outfall 009 – NCCW & Backwash (zebra mussel control)

Parameter	Daily Maximum	Daily Minimum	Footnotes
Flow Rate			1,2
BOD_5			1,2
Dissolved Oxygen		5.0 mg/L	1
Residual Chlorine	38 μg/L		1
Copper			3
Phosphorus			3
Temperature			2
Arsenic			2
Mercury			2
PFOS and PFOA			4
WET			5,6

Outfall 010 – Water plant pump house (zebra mussel control)

Parameter	Daily Maximum	Daily Minimum	Footnotes
Flow Rate			1,2
BOD_5	30 mg/L		1
TSS			1,2
Dissolved Oxygen		5.0 mg/L	1
Residual Chlorine	38 μg/L		1

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. Monthly monitoring for one year.
4. Monthly monitoring is required in accordance with s. NR 106.98(2), Wis. Adm. Code.
5. 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).
6. 3/permit term acute and chronic WET tests are recommended in the reissued permit. The Instream Waste Concentration (IWC) to assess chronic test results is 9%. 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 shall be a grab sample collected from Lake Michigan.

BOD, TSS, DO, and total residual chlorine monitoring and limits are only required when controlling zebra mussels at Outfalls 004, 009, and 010.

Intake monitoring for arsenic and mercury is also recommended.

Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are not required due to the non-continuous nature of the discharge.

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

Attachments (3) – Narrative, Thermal Tables & Map

PREPARED BY: Nicole Krueger, Water Resources Engineer – SER

E-cc: Trevor Moen, Wastewater Engineer – NER
Heidi Schmitt Marquez, Regional Wastewater Supervisor – NER
Kari Fleming, Environmental Toxicologist – WY/3
Laura Dietrich, Wastewater Specialist – WY/Waukesha

Attachment #1

Water Quality-Based Effluent Limitations for Manitowoc Public Utilities

WPDES Permit No. WI-0027189-08

Prepared by: Nicole Krueger

PART 1 – BACKGROUND INFORMATION

Facility Description

Manitowoc Public Utilities ("MPU") is a municipal electric, steam, broadband and water utility that operates a coal and petroleum coke fired power plant and a membrane filtration water treatment plant in the City of Manitowoc. Noncontact cooling water, process wastewater, backwash water and other wastewaters are discharged via several outfalls located on the shore of Lake Michigan within 1000 feet of each other. The individual outfalls are described in more detail below. Sanitary wastewater, traveling screen washwater, clean-in-place wastewater from the water treatment plant, boiler blowdown, carbon filter backwash, reverse osmosis reject, demineralizer wastewater, and miscellaneous other wastewater are directed to the sanitary sewer system.

- Outfall 003 – This outfall conveys the discharge from the storm water runoff settling tank along with other storm water runoff. The runoff settling tank is used to treat runoff from the coal and petroleum coke storage area. The discharge from this tank is identified as sample point 107 in the permit.
- Outfall 004 – This outfall conveys the discharge from an oil/water separator (sample point 101) that treats noncontact cooling water from turbines, air compressors and boiler.
- Outfall 009 – This outfall conveys the combined discharge of backwash water from microfiltration units at the water treatment plant (sample point 105) and the once-through condenser cooling water at the power plant (sample point 109). When the total suspended solids (TSS) concentration exceeds 40 mg/L, wastewater from the backwash basin is diverted to the sanitary sewer from treatment at the Manitowoc WWTF, the municipal wastewater treatment facility. Temperature monitoring is required at sample point 109.
- Outfall 010 – This outfall conveys water that is pumped from the water plant shore well during periodic maintenance. This maintenance may include treatment for removal of zebra mussels. Total residual chlorine limits (if chlorine in any form is used) is required only during the discharge of water that has been treated for zebra mussel control.

Attachment #3 is a map of the area showing the approximate location of Outfalls 003, 004, 009, 010.

Existing Permit Limitations

The current WPDES permit, expiring on 03/31/2023, includes the following effluent limitations and monitoring requirements.

<u>Surface Water Discharge</u>

Outfall 003 (Sampling Point 107) – Runoff Settling Tank

Parameter	Daily Maximum	Footnotes
Flow Rate		1

Parameter	Daily Maximum	Footnotes
TSS	50 mg/L	2
Arsenic		1
Mercury		1
Phosphorus		1
Copper	43 µg/L	
Lead		1
Zinc	320 µg/L	

Outfall 004 – NCCW & oil/water separator (zebra mussel control)

Parameter	Daily Maximum	Daily Minimum	Footnotes
Flow Rate			1
BOD_5			1
Dissolved Oxygen		5.0 mg/L	3
Residual Chlorine	38 µg/L		

Outfall 009 – NCCW & Backwash (zebra mussel control)

Parameter	Daily Maximum	Daily Minimum	Footnotes
Flow Rate			1
BOD_5			1
Dissolved Oxygen		5.0 mg/L	3
Residual Chlorine	38 µg/L		
Copper			1

Outfall 010 – Water plant pump house (zebra mussel control)

Parameter	Daily Maximum	Daily Minimum	Footnotes
Flow Rate			1
BOD_5	30 mg/L		3
TSS			1
Dissolved Oxygen		5.0 mg/L	3
Residual Chlorine	38 µg/L		

<u>Internal Sampling Points (limits and monitoring requirements not evaluated in this memo)</u>
Sampling Point 101 – Oil/Water Separator (discharges through Outfall 004)

Parameter	Daily Maximum	Footnotes
Flow Rate		1
Oil & Grease	15 mg/L	2

Parameter	Daily Maximum	Footnotes
Temperature		

Sampling Point 105 – Microfilter Backwash (discharges through Outfall 009)

Parameter	Daily Maximum	Daily Minimum	Footnotes
Flow Rate			1
pH	9.0 su	6.0 su	
TSS	40 mg/L		
Phosphorus			1

Sampling Point 109 – Oil/Water Separator (discharges through Outfall 009)

Parameter	Footnotes
Flow Rate	1
Temperature	1

Footnotes:

1. Monitoring only.
2. This limit is a categorical limit based on ch. NR 290, Wis. Adm. Code and not evaluated in this memo.
3. The BOD_5 and DO limits were included in previous permits as best professional judgement limits when additives are used for zebra mussel control. These limits aren't evaluated in this memo.

Receiving Water Information

- Name: Lake Michigan
- Waterbody Identification Code (WBIC): 20
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Coldwater (CW) community, public water supply.
- Flow: A ten-to-one dilution ratio will be used for calculating effluent limitations based on chronic or long-term impacts, in accordance with s. NR 106.06(4)(b)2, Wis. Adm. Code, because the receiving water does not exhibit a unidirectional flow at the point of discharge.
- Hardness = 129 mg/L as $CaCO_3$. This value represents the geometric mean of data from WET tests from 09/27/2018 – 11/09/2021 from Manitowoc WWTF.
- Source of background concentration data: Metals data from Lake Michigan 7 miles off Milwaukee from the "Water Quality Rules Implementation" (1995) is used for this evaluation. Background arsenic data was collected by WE Port Washington from 10/03/2017 – 07/12/2022. Background mercury data is from intake data from WI Power and Light Edgewater Generating Station near Sheboygan. 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: There are several other dischargers to Lake Michigan, however they are not in the immediate vicinity and the mixing zones do not overlap. Therefore, the other dischargers do not impact this evaluation.
- Impaired water status: Lake Michigan is 303(d) is listed as impaired for mercury.

Effluent Information

- Flow rate(s):

  Outfall 010 maximum annual average = 0.00030 MGD (Million Gallons per Day)
  For reference, the actual average flow from 04/01/2018 – 09/30/2022 for Outfall 010 was 0.00013 MGD.

  Outfall 003 (SP 107) maximum annual average = 0.012 MGD (Million Gallons per Day)
  For reference, the actual average flow from 04/01/2018 – 09/30/2022 for Outfall 010 was 0.012 MGD.

  Outfall 004 (SP 101) maximum annual average = 0.052 MGD (Million Gallons per Day)
  For reference, the actual average flow from 04/01/2018 – 09/30/2022 for Outfall 010 was 0.028 MGD.

  Outfall 009 (SP 109 and SP 105) maximum annual average = 57.4 MGD (Million Gallons per Day)
  For reference, the actual average flow from 04/11/2018 – 09/25/2022 for Outfall 009 was 49.1 MGD.

- Hardness:

  -Outfall 003 (SP 107):
  283 mg/L as $CaCO_3$. This value represents the geometric mean of data from 08/03/2022 – 08/26/2022.

  -Outfall 004:
  131 mg/L as $CaCO_3$. This value represents the geometric mean of data from 08/30/2022 – 09/12/2022.

  -Outfall 009:
  133 mg/L as $CaCO_3$. This value represents the geometric mean of data from 08/03/2022 – 08/16/2022.

- 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: Lake Michigan.
- Additives: Sodium hypochlorite is used for zebra mussel control and sodium bisulfite is added for dechlorination. Summit Chemical Sumalchlor 50 and Hawkins Aqua Hawk 607 are added for pre-treatment in water treatment plant. Benetech GDS-12 is added as a dust suppressant. Kemira Superfloc C-1592RS is added for flocculation. These are evaluated in Part 8.
- Effluent characterization: This facility is categorized as a primary industrial discharger, so the permit application required effluent sample analyses for all the "priority pollutants" except for the Dioxins and Furans as specified in s. NR 200.065, Table 1, Wis. Adm. Code. The permit-required monitoring for copper from April 2018 to March 2019 is 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 004 Effluent Copper Data

Sample Date	Copper µg/L
08/30/2022	24
09/03/2022	35.1
09/07/2022	16.4
09/12/2022	26
Average	25.4

Attachment #1

Outfall 009 Effluent Copper Data

Sample Date	Copper µg/L	Sample Date	Copper µg/L	Sample Date	Copper µg/L
04/12/2018	<6.3	08/15/2018	6.3	12/12/2018	<6.3
05/14/2018	4.2	09/12/2018	2.1	01/09/2019	1.9
06/06/2018	<6.3	10/03/2018	3.7	02/13/2019	<6.3
07/11/2018	<6.3	11/14/2018	<4.8	03/20/2019	<6.3
Average = 0.99 µg/L					

"<" 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.

Outfall 003 (Sampling Point 107) Effluent Data

Sample Date	**Arsenic µg/L**	**Sample Date**	**Arsenic µg/L**	**Sample Date**	**Arsenic µg/L**
04/12/2018	<8.3	08/15/2018	<8.3	12/12/2018	8.6
05/14/2018	2.7	09/17/2018	<8.3	01/16/2019	<8.3
06/06/2018	<8.3	10/03/2018	2.2	02/13/2019	<8.3
07/11/2018	<8.3	11/14/2018	7.5	03/20/2019	<8.3
				08/16/2022	<8.3
Average = 1.62 µg/L					
Sample Date	**Mercury ng/L**	**Sample Date**	**Mercury ng/L**	**Sample Date**	**Mercury ng/L**
5/14/2018	<1.8	10/7/2019	<0.20	4/13/2021	0.31
7/11/2018	<1.8	1/13/2020	<0.20	9/14/2021	0.23
10/3/2018	<1.8	4/14/2020	<0.20	10/21/2021	0.33
2/13/2019	0.13	7/7/2020	0.63	2/1/2022	0.29
4/8/2019	1.4	10/5/2020	0.31	4/21/2022	0.21
7/9/2019	<0.20	1/11/2021	<0.20	7/6/2022	0.55
Average = 0.24 µg/L					
Sample Date	**Zinc µg/L**	**Sample Date**	**Zinc µg/L**	**Sample Date**	**Zinc µg/L**
04/12/2018	27	10/03/2018	33	01/13/2020	43
05/14/2018	33.9	11/14/2018	47	01/11/2021	19
06/06/2018	23	12/12/2018	47	02/01/2022	<11.6
07/11/2018	28	01/16/2019	37	08/16/2022	12
08/15/2018	27	02/13/2019	27		
09/17/2018	28	03/20/2019	24		
1-day P_{99} = 60 µg/L					
4-day P_{99} = 45 µg/L					
Sample Date	**Lead µg/L**	**Sample Date**	**Lead µg/L**	**Sample Date**	**Lead µg/L**
04/12/2018	<4.3	10/03/2018	<0.24	08/16/2022	<5.9
05/14/2018	<0.9	11/14/2018	<6.4		
06/06/2018	<4.3	12/12/2018	<5.9		
07/11/2018	<4.3	01/16/2019	<5.9		
08/15/2018	<4.3	02/13/2019	<5.9		
09/17/2018	<5.9	03/20/2019	<5.9		

Average = 0 µg/L

"<" 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 Sample Point 107 from 04/01/2018 – 09/30/2022 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Averages of Parameters with Limits

	Average Measurement Sample Point 107 (Outfall 003)	Average Measurement Sample Point 101 (Outfall 004)
TSS	2.06 mg/L*	
Copper	0.84 µg/L*	
Zinc	29.6 mg/L*	
Oil & Grease		0.98 mg/L*

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

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

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

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

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 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).

Outfall 003 (Sampling Point 107)

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

10:1 dilution

SUBSTANCE	REF. HARD.* mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day MAX. CONC.
Arsenic		340	1.00	680	136	1.62	
Cadmium	283	14.4	0.01	28.7	5.7	<1.3	
Chromium	283	4227	0.49	8454	1691	<2.5	
Copper	283	41.4	0.44	82.8	16.6	1.05	
Lead	283	292	0.05	584	116.9	<5.9	
Mercury		830	0.40	1660		0.24	
Nickel	268	1080		2161	432	7	
Zinc	283	299	0.39	598			60
Chloride (mg/L)		757		1514.0	303	87.5	

* The indicated hardness may differ from the effluent hardness because the effluent hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the acute criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

* * 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.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

10:1 dilution

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day MAX. CONC.
Arsenic		148	1.00	1618	324	1.62	
Cadmium	129	3.01	0.01	33.0	6.6	<1.3	
Chromium	129	106	0.49	1163	233	<2.5	
Copper	129	12.9	0.44	137	27.4	1.05	
Lead	129	35.8	0.05	394	78.7	<5.9	
Mercury		440	0.40	440		0.24	
Nickel	129	64.7		712	142	7	
Zinc	129	150	0.39	1651			45
Chloride (mg/L)		395		4345	869	87.5	

* 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.

Monthly Average Limits based on Wildlife Criteria (WC)

10:1 dilution

SUBSTANCE	WC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Mercury (ng/L)	1.30	0.40	1.30	0.26	0.24

Monthly Average Limits based on Human Threshold Criteria (HTC)

10:1 dilution

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	4.4	0.01	48	9.7	<1.3
Chromium (+3)	100	0.49	1095	219	<2.5
Lead	10	0.05	109	21.9	<5.9
Mercury	1.5	0.40	1.5	0.30	0.24
Nickel	100	0.00	1100	220	7

Monthly Average Limits based on Human Cancer Criteria (HCC)

10:1 dilution

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	0.2	1.00	0.2	0.04	**1.62**

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.

<u>Outfall 004</u>

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

10:1 dilution

SUBSTANCE	REF. HARD.* mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day MAX. CONC.
Arsenic		340	1.00	680	136	<8.3	
Cadmium	131	5.9	0.01	11.9	2.4	<1.3	
Chromium	131	2249	0.49	4499	900	<2.5	
Copper	131	20.0	0.44	40.0	8.01	**25.4**	35.1
Lead	131	139	0.05	278	55.5	<5.9	
Mercury		830	0.40	1660	332	<66	
Nickel	131	590		1179	236	3.4	

SUBSTANCE	REF. HARD.* mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day MAX. CONC.
Zinc	131	152	0.39	305	61.0	16.4	
Chloride (mg/L)		757		1514	303	14.1	

* The indicated hardness may differ from the effluent hardness because the effluent hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the acute criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.
* * 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.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)
10:1 dilution

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic		148	1.00	1618	324	<8.3
Cadmium	129	3.01	0.01	33.0	6.61	<1.3
Chromium	129	106	0.49	1163	233	<2.5
Copper	129	12.9	0.44	137	27.4	25.4
Lead	129	35.8	0.05	394	78.7	<5.9
Mercury		440	0.40	440	88.0	<66
Nickel	129	64.7		712	142	3.4
Zinc	129	150	0.39	1651	330	16.4
Chloride (mg/L)		395		4345	869	14.1

* 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.

Monthly Average Limits based on Wildlife Criteria (WC)
10:1 dilution

SUBSTANCE	WC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	MEAN EFFL. CONC.
Mercury (ng/L)	1.30	0.40	1.30	<66

Monthly Average Limits based on Human Threshold Criteria (HTC)
10:1 dilution

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	4.4	0.01	48	9.7	<1.3
Chromium (+3)	100	0.49	1095	219	<2.5
Lead	10	0.05	109	21.9	<5.9
Mercury	1.5	0.40	1.5	0.3	<66
Nickel	100	0.00	1100	220	3.40

Monthly Average Limits based on Human Cancer Criteria (HCC)

10:1 dilution

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	0.2	1.00	0.2	0.04	<8.3

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.

Outfall 009

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

10:1 dilution

SUBSTANCE	REF. HARD.* mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic		340	1.00	680	136	<8.3
Cadmium	283	14.4	0.01	28.7	5.75	<1.3
Chromium	283	4227	0.49	8454	1691	<2.5
Copper	283	41.4	0.44	82.8	16.6	0.99
Lead	283	292	0.05	584	117	<5.9
Mercury		830	0.40	1660	332	<66
Nickel	268	1080		2161	432	<2.6
Zinc	283	299	0.39	598	120	<11.6
Chloride (mg/L)		757		1514	303	13

* The indicated hardness may differ from the effluent hardness because the effluent hardness exceeded the maximum range in ch. NR 105, Wis. Adm. Code, over which the acute criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

* * 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.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

10:1 dilution

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic		148	1.00	1618	324	<8.3
Cadmium	129	3.01	0.01	33.0	6.61	<1.3
Chromium	129	106	0.49	1163	233	<2.5
Copper	129	12.9	0.44	137	27.4	0.99
Lead	129	35.8	0.05	394	78.7	<5.9
Mercury		440	0.40	440	88.0	<66
Nickel	129	65		712	142	<2.6
Zinc	129	150	0.39	1651	330	<11.6
Chloride (mg/L)		395		4345	869	13

* 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.

Monthly Average Limits based on Wildlife Criteria (WC)
10:1 dilution

SUBSTANCE	WC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	MEAN EFFL. CONC.
Mercury (ng/L)	1.30	0.40	1.30	<66

Monthly Average Limits based on Human Threshold Criteria (HTC)
10:1 dilution

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	4.4	0.01	48	9.7	<1.3
Chromium (+3)	100	0.49	1095	219	<2.5
Lead	10	0.05	109	21.9	<5.9
Mercury	1.5	0.40	1.5	0.30	<66
Nickel	100		1100	220	<2.6

Monthly Average Limits based on Human Cancer Criteria (HCC)
10:1 dilution

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	0.2	1.00	0.2	0.04	<8.3

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.

Outfall 010: There are no effluent data for toxic parameters from the current permit term. The outfall mostly consists of raw water from Lake Michigan and has very infrequent discharge.

Conclusions and Recommendations
Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are required for arsenic and copper.

Arsenic – The average of representative data for Outfall 003 is 1.62 µg/L, which is greater than the most stringent limit (human cancer criteria µg/L); therefore, a limit is required for arsenic for Outfall 003.

Section NR 106.06(6), Wis. Adm. Code, allows a facility to demonstrate that a pollutant present in intake water, which is passed through the facility and discharged does not cause, have the reasonable potential to

cause, or contribute to the excursion of water quality criteria in the receiving water. The demonstration has five conditions, all of which must be met:

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

MPU monitors intake arsenic and effluent arsenic for Outfalls 003 and 009 and also comingled effluent from Outfalls 003, 004, and 009 shown below:

	Intake Arsenic µg/L	Effluent Arsenic Outfall 009 µg/L	Comingled Effluent (Outfalls 003, 004, 009) µg/L		Effluent Arsenic Outfall 003 µg/L
04/08/2019	<8.3	<8.3	<8.3	04/12/2018	<8.3
05/15/2019	<8.3	<8.3	<8.3	05/14/2018	2.7
06/05/2019	<8.3	<8.3	<8.3	06/06/2018	<8.3
07/09/2019	<8.3	<8.3	<8.3	07/11/2018	<8.3
08/14/2019	<8.3	<8.3	<8.3	08/15/2018	<8.3
09/17/2019	<8.3	<8.3	<8.3	09/17/2018	<8.3
10/02/2019	<8.3	<8.3	<8.3	10/03/2018	2.2
11/12/2019	<8.3	<8.3	<8.3	11/14/2018	7.5
12/04/2019	<8.3	<8.3	<8.3	12/12/2018	8.6
01/07/2020	<8.3	<8.3	<8.3	01/16/2019	<8.3
02/05/2020	<8.3	<8.3	<8.3	02/13/2019	<8.3
03/04/2020	<8.3	<8.3	<8.3	03/20/2019	<8.3
04/01/2020	<8.3	<8.3	<8.3		
05/06/2020	<8.3	<8.3	<8.3		
06/03/2020	<8.3	9.5	9.5		
07/08/2020	<8.3	<8.3	<8.3		
08/05/2020	<8.3	<8.3	<8.3		
09/02/2020	<8.3	<8.3	<8.3		
10/07/2020	0.79	0.82	0.89		
11/04/2020	<8.3	<8.3	<8.3		
12/02/2020	<8.3	<8.3	<8.3		

01/06/2021	<8.3	<8.3	<8.3		
02/03/2021	<5	<5	<5		
03/03/2021	<5	<5	<5		

The intake data for arsenic does not have low enough LODs to determine that the facility is not adding additional arsenic mass to the effluent. The rest of the conditions listed above are met. **Effluent monitoring for each outfall (003 (107), 004, and 009) and intake monitoring is recommended to be included in the reissued permit. The LOD should be stringent enough to determine if a limit is needed (≤ 0.20 µg/L).**

Copper

Outfall 003: The current permit includes a daily maximum copper limit of 43 µg/L for Outfall 003 (SP 107). **This limit is recommended to continue in the reissued permit per s. NR 205.067(5) Wis. Adm. Code.**

A mass limit is also needed when a concentration limit is included in the permit for antidegradation purposes. The acute mass limitation of 0.047 lbs/day is based on the concentration limit and the peak daily flow rate of 0.13 MGD from the previous ten years (43 µg/L * 0.13 MGD * 8.34/1000) in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

Outfall 004: The average copper effluent data is 25.4 µg/L from 08/30/2022 – 09/12/2022 from the permit application. This is greater than $1/5^{th}$ of the calculated daily maximum limit of 40 µg/L, therefore **a daily maximum limit of 40 µg/L** is required per s. NR 106.05(6)(b) Wis. Adm. Code. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are not required due to the non-continuous nature of the discharge.

A mass limit is also needed when a concentration limit is included in the permit. The acute mass limitation of 0.055 lbs/day is based on the concentration limit and the peak daily flow rate of 0.165 MGD from November 2023 (40 µg/L * 0.165 MGD * 8.34/1000) in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

Outfall 009: Considering available effluent data from the current permit term (04/12/2018 – 03/20/2019), the average is 0.99 µg/L, which is less than $1/5^{th}$ of the most stringent calculated limit. Therefore, no effluent limits are needed. Copper monitoring is recommended to ensure that 11 sample results are available at the next permit issuance to meet the data requirements of s. NR 106.85, Wis. Adm. Code.

Total Residual Chlorine – Because chlorine is added as a zebra mussel control, **effluent limitations are recommended to assure proper operation of the de-chlorination system for Outfall 004, 009, and 010. Specifically, a daily maximum limit of 38 µg/L is required.** Due to revisions to s. NR 106.07(2), Wis. Adm. Code, mass limitations are no longer required. Weekly average limitations are not needed based on reasonable potential as the daily maximum limitations will provide adequate protection of the resource. Additional limits are not needed because the zebra mussel control is not continuous.

Zinc – There is currently a daily maximum zinc limit for Outfall 003 (sampling point 107) of 320 µg/L. **This limit is recommended to continue in the reissued permit per s. NR 205.067(5) Wis. Adm. Code.**

A mass limit is also needed when a concentration limit is included in the permit for antidegradation purposes. The acute mass limitation of 0.35 lbs/day is based on the concentration limit and the peak daily flow rate of 0.13 MGD from the previous ten years (320 µg/L * 0.13 MGD * 8.34/1000) in accordance with s. NR 106.07(2)(a), Wis. Adm. Code.

Lead – There is currently monitoring for lead required for Outfall 003 (sampling point 107). Because all 12 data points were reported as non-detect, **monitoring is not recommended to continue in the reissued permit.**

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.

The LOD used for Outfalls 004 and 009 was 66 ng/L which is greater than the calculated limit of 1.3 ng/L, so reasonable potential cannot be determined. **Monitoring is recommended for permit reissuance for Outfalls 004 and 009 to determine if there is reasonable potential for a limit. The LOD should be less than 1.3 ng/L. Intake monitoring is also recommended to determine if MPU is adding additional mass to the effluent.**

The average mercury data for Outfall 003 during the permit term was 0.24 ng/L, which is less than 1/5th of the most stringent calculated limit. Therefore, there is not reasonable potential for a mercury limit. **Monitoring is recommended to continue at Outfall 003 (SP 107) in the reissued permit. The LOD should be less than 1.3 ng/L.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Based on the type of discharge (primary industrial discharge), **PFOS and PFOA monitoring is recommended at a monthly frequency for Outfalls 003, 004, and 009.** No monitoring is recommended at Outfall 010 due to the type of discharge (raw water sump pump) and the very infrequent discharge.

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 MPU does not currently have ammonia nitrogen limits, the need for limits is evaluated at this time.

Outfall 003 Ammonia Nitrogen Effluent Data

Sample Date	Ammonia Nitrogen mg/L
08/03/2022	1.5
08/16/2022	<0.14
08/22/2022	<0.14
08/26/2022	<0.14
Average	0.375

Attachment #1

Outfall 004 Ammonia Nitrogen Effluent Data

Sample Date	Ammonia Nitrogen mg/L
08/30/2022	<0.14
09/03/2022	<0.14
09/04/2022	<0.14
09/12/2022	0.29
Average	0.0725

Outfall 009 Ammonia Nitrogen Effluent Data

Sample Date	Ammonia Nitrogen mg/L
08/03/2022	<0.14
08/08/2022	<0.14
08/12/2022	<0.14
08/16/2022	<0.14
Average	<0.14

Theses concentrations are low, and well below any of the applicable criteria or acute water quality-based effluent limits for Lake Michigan. Therefore, **no water quality-based effluent limits or monitoring for ammonia nitrogen are recommended in the reissued permit.**

PART 4 – PHOSPHORUS

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 monthly average limit of 1.0 mg/L, or an approved alternative concentration limit.

Because MPU does not currently have an existing technology-based limit, the need for this limit in the reissued permit is evaluated. The data demonstrates that the annual monthly average phosphorus loading is less than 60 lbs/month, which is the threshold for industrials in accordance to s. NR 217.04(1)(a)2, Wis. Adm. Code, and therefore no technology-based limit is required.

Outfall 003 (Sample Point 107) Annual Average Mass Total Phosphorus Loading

Month	Result mg/L	Total Flow MG/month	Total Phosphorus lb./mo.
Oct 2019	0.037	0.666	0.206
Jan 2020	0.026	0.570	0.124
Apr 2020	0.067	0.633	0.354
Jul 2020	0.025	1.21	0.252
Oct 2020	0.094	0.934	0.732
Jan 2021	<0.022	0.227	0
Apr 2021	0.06	0.253	0.127
Jul 2021	0.047	0.581	0.228
Oct 2021	<0.031	0.362	0
Feb 2022	<0.014	0.115	0
Apr 2022	<0.02	0.145	0

Jul 2022	0.06	0.278	0.139
Average			0.180

Total P (lbs/month) = Monthly average (mg/L) × total flow (MG/month) × 8.34 (lbs/gallon)
Where total flow is the sum of the actual (not design) flow (in MGD) for that month

Outfall 004 Annual Average Mass Total Phosphorus Loading

Month	Average mg/L	Total Flow MG/month	Total Phosphorus lb./mo.
Jun 2022	0.068	1.62	0.923
Jul 2022	0.128	0.713	0.758
Aug 2022	0.192	0.837	1.34
Average			1.01

Total P (lbs/month) = Monthly average (mg/L) × total flow (MG/month) × 8.34 (lbs/gallon)
Where total flow is the sum of the actual (not design) flow (in MGD) for that month

Outfall 009 Annual Average Mass Total Phosphorus Loading

Month	Result mg/L	Total Flow MG/month SP 105 & 109	Total Phosphorus lb./mo.
Apr 2020	0.063	38.0	20.0
May 2020	0.03	39.9	10.0
Jun 2020	0.035	41.5	12.1
Jul 2020	<0.022	45.0	0.0
Aug 2020	0.11	45.2	41.5
Sep 2020	0.024	40.5	8.11
Oct 2020	0.026	40.9	8.87
Nov 2020	0.13	38.4	41.6
Dec 2020	0.067	41.5	23.2
Jan 2021	0.023	40.6	7.79
Feb 2021	0.072	38.2	22.9
Mar 2021	0.084	42.5	29.8
Average			18.8

Total P (lbs/month) = Monthly average (mg/L) × total flow (MG/month) × 8.34 (lbs/gallon)
Where total flow is the sum of the actual (not design) flow (in MGD) for that month

In addition, the need for a WQBEL for phosphorus must be considered.

Water Quality-Based Effluent Limits (WQBEL)
Revisions to administrative rules regulating phosphorus took effect on December 1, 2010. These rule revisions include additions to s. NR 102.06, Wis. Adm. Code, which establish phosphorus standards for surface waters. Subchapter III of NR 217, Wis. Adm. Code, establishes procedures for determining WQBELs for phosphorus, based on the applicable standards in ch. NR 102, Wis. Adm. Code.

Section NR 102.06(5)(b) specifies that a total phosphorus criterion of 7 µg/L (0.007 mg/L) applies for the open and nearshore water of Lake Michigan. For direct discharges to Lake Michigan such as MPU, s. NR 217.13(4), Wis. Adm. Code, states that the Department shall set effluent limits consistent with nearshore or whole lake models approved by the Department. In the absence of an approved model, a WQBEL of 0.6 mg/L as a six-month average is recommended if there is reasonable potential.

Effluent Data
The following table summarizes effluent total phosphorus monitoring data from May 2018 – August 2022.

Total Phosphorus Effluent Data

	Outfall 003 Phosphorus mg/L	Outfall 004 Phosphorus mg/L	Outfall 009 Phosphorus mg/L
1-day P_{99}	0.38	0.36	0.19
4-day P_{99}	0.22	0.25	0.12
30-day P_{99}	0.11	0.17	0.07
Mean	0.068	0.14	0.055
Std	0.08	0.07	0.04
Sample size	18	12	12
Range	<0.014 – 0.33	<0.018 – 0.28	<0.022 – 0.13

"<" 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.

Reasonable Potential Determination
MPU's discharge does not have reasonable potential to cause or contribute to an exceedance of the 0.6 mg/L limit because the 30-day P_{99} of reported effluent total phosphorus data is less than the limit**.** Therefore, **limits are not required. Monthly monitoring for one year is recommended for Outfalls 003, 004, and 009.**

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.

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

Outfall 009

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 04/01/2018 – 09/30/2022 from Outfalls 109 and 105. The temperature data is from Outfall 109 from 04/01/2018 – 09/30/2022 which makes up the majority of the flow to Outfall 009.

Outfall 009 Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature at Outfall 109		Calculated Effluent Limit	
	Weekly Maximum (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	72	78	**62**	102
FEB	71	77	71	99
MAR	65	73	92	107
APR	56	68	82	93
MAY	80	86	90	91
JUN	80	82	**85**	**86**
JUL	92	98	**77**	**84**
AUG	94	97	**71**	**85**
SEP	93	95	**61**	94
OCT	88	91	**52**	95
NOV	78	84	**50**	90
DEC	65	71	**62**	102

There is one day of available temperature data (09/12/2022) for Outfall 009 from the permit application which was 84°F.

MPU submitted a thermal mixing zone study in November 2014 which was approved in 2016. The study demonstrated that the plume from Outfall 009 is relatively small; ranging from 0.11 to 38.54 acres which is expected to hug the shoreline and not have significant impacts on aquatic life. The actual mixing zone size is significantly less than the maximum mixing zone given in NR 106.55(7)(b), Wis. Adm. Code of 71.4 acres. This demonstrates that the maximum mixing zone size is not needed for MPU to meet the thermal requirements for Lake Michigan. The effluent flow rates have stayed the same or decreased for some months as compared to the effluent flow at the time of the mixing zone study, so the actual mixing zones are expected to be the same or smaller currently. The effluent temperature from the time of the study is also comparable to the effluent temperature from the current permit. Therefore, **no temperature limits are needed. Monitoring for Outfall 009 is recommended in the reissued permit.**

Outfall 004

Due to the 10:1 dilution for the lake discharge, the lowest calculated limitation is 120° F (s. NR 106.55(7)(b), Wis. Adm. Code). The table below summarizes the maximum temperatures reported during monitoring from 04/01/2018 – 09/30/2022. The data is from Sample Point 101 which is representative of effluent at Outfall 004.

Outfall 004 Monthly Temperature Effluent Data & Limits

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	57	57	NA	120
FEB	59	59	NA	120
MAR	66	66	NA	120
APR	60	60	NA	120
MAY	66	66	NA	120
JUN	60	60	NA	120
JUL	67	67	NA	120
AUG	71	71	NA	120
SEP	68	68	NA	120
OCT	53	53	NA	120
NOV	47	47	NA	120
DEC	62	62	NA	120

Based on the available effluent data no effluent limits are recommended for temperature. The complete thermal table used for the limit calculation is attached. **Monitoring is recommended to continue in the reissued permit.**

Outfalls 003 & 010

Due to the 10:1 dilution for the lake discharge, the lowest calculated limitation is 120° F (s. NR 106.55(7)(b), Wis. Adm. Code).

Monthly Temperature Effluent Data & Limits

Month	Outfall 003 Calculated Effluent Limit		Outfall 010 Calculated Effluent Limit	
	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	NA	120	NA	120
FEB	NA	120	NA	120
MAR	NA	120	NA	120

Attachment #1

Month	Outfall 003 Calculated Effluent Limit		Outfall 010 Calculated Effluent Limit	
	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
APR	NA	120	NA	120
MAY	NA	120	NA	120
JUN	NA	120	NA	120
JUL	NA	120	NA	120
AUG	NA	120	NA	120
SEP	NA	120	NA	120
OCT	NA	120	NA	120
NOV	NA	120	NA	120
DEC	NA	120	NA	120

Outfall 003: There is one day of temperature data (08/16/2022) for Outfall 003 from the permit application which was 68 °F. This data is significantly lower than the lowest calculated temperature limit of 120 °F. Therefore, **no temperature limits or monitoring are recommended in the reissued permit.**

Outfall 010: This outfall contains mostly water from Lake Michigan and has very infrequent discharge. There is one day of temperature data (03/19/2007) for Outfall 010 from the previous permit application which was 42 °F. This data is significantly lower than the lowest calculated temperature limit of 120 °F. Therefore, no temperature limits are recommended in the reissued permit. Due to the unpredictable and very low flows from this outfall, monitoring is not recommended either.

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).*

- 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 of 9% 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:

The IWC is 9% based on dilution of 10 parts lake water to 1-part effluent, as specified in s. NR 106.06(4)(b)2, Wis. Adm. Code, or a factor of 1 in 11 to calculate the IWC.

- 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 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 Outfalls 004 & 009. 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.

WET Data History

Outfall	Date Test Initiated	Chronic Results IC_{25} %				
		C. dubia	Fathead Minnow	Algae (IC_{50}%)	Pass or Fail?	Use in RP?
004	07/11/2006	>100	>100	>100	Pass	Yes
009	07/11/2006	>100	>100	>100	Pass	Yes

- 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.**

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

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

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

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.

Outfall 003 WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. **0 Points**	IWC = 9 %. **0 Points**
Historical Data	0 tests used to calculate RP. **5 Points**	0 tests used to calculate RP. **5 Points**
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. **0 Points**	Same as Acute. **0 Points**
Receiving Water Classification	Full fish and aquatic life **5 Points**	Same as Acute. **5 Points**
Chemical-Specific Data	Reasonable potential for limits for copper based on ATC;. Arsenic, mercury, nickel, zinc, chloride, and ammonia detected. Additional Compounds of Concern: 0 **8 Points**	Reasonable potential limits for no substances based on CTC; Arsenic, copper, mercury, nickel, zinc, chloride, and ammonia detected. Additional Compounds of Concern: 0 **3 Points**
Additives	0 Biocides and 2 Water Quality Conditioners added. No P treatment. **2 Points**	One additive used more than once per 4 days. **2 Points**
Discharge Category	Petroleum and coal pile runoff. **0 Points**	Same as Acute. **0 Points**
Wastewater Treatment	Primary Treatment Only **8 Points**	Same as Acute. **8 Points**
Downstream Impacts	No impacts known **0 Points**	Same as Acute. **0 Points**
Total Checklist Points:	**28 Points**	**23 Points**
Recommended Monitoring Frequency (from Checklist):	2 tests during permit term (year 2, 4, 6, etc.)	2 tests during permit term (year 2, 4, 6, etc.)
Limit Required?	No	No

	Acute	Chronic
TRE Recommended? (from Checklist)	No	No

- The discharge from Outfall 003 is expected to be low in toxicity. The flow is not continuous or predictable which would make collecting effluent for WET testing very difficult.
- After consideration of the guidance provided in the Department's WET Program Guidance Document (2019) and other information described above, no WET tests are recommended in the reissued permit.

Outfall 004 WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. **0 Points**	IWC = 9 %. **0 Points**
Historical Data	0 tests used to calculate RP. **5 Points**	1 test used to calculate RP. Data is over 5 years old. **5 Points**
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. **0 Points**	Same as Acute. **0 Points**
Receiving Water Classification	Full fish and aquatic life **5 Points**	Same as Acute. **5 Points**
Chemical-Specific Data	Reasonable potential for limits for copper based on ATC; Chloride, copper, nickel, zinc, and ammonia detected. Additional Compounds of Concern: 0 **8 Points**	Reasonable potential limits for no substances based on CTC; Chloride, copper, nickel, zinc, and ammonia detected. Additional Compounds of Concern: 0 **3 Points**
Additives	0 Biocides and 0 Water Quality Conditioner added. No P treatment. **0 Points**	No additives used. **0 Points**
Discharge Category	NCCW and compressed air tank drains and blowdown **0 Points**	Same as Acute. **0 Points**
Wastewater Treatment	Primary Treatment Only **8 Points**	Same as Acute. **8 Points**
Downstream Impacts	No impacts known **0 Points**	Same as Acute. **0 Points**
Total Checklist Points:	**26 Points**	**21 Points**
Recommended Monitoring Frequency (from Checklist):	3 tests during permit term (year 1, 3, 5, etc.)	2 tests during permit term (year 2, 4, 6, etc.)

	Acute	Chronic
Limit Required?	No	No
TRE Recommended? (from Checklist)	No	No

- The discharge from Outfall 004 is expected to be low in toxicity. The flow is not continuous or predictable which would make collecting effluent for WET testing very difficult.
- After consideration of the guidance provided in the Department's WET Program Guidance Document (2019) and other information described above, no WET tests are recommended in the reissued permit.

Outfall 009 WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not Applicable. **0 Points**	IWC = 9 %. **0 Points**
Historical Data	0 tests used to calculate RP. **5 Points**	1 test used to calculate RP. Data is over 5 years old. **5 Points**
Effluent Variability	Little variability, no violations or upsets, consistent WWTF operations. **0 Points**	Same as Acute. **0 Points**
Receiving Water Classification	Full fish and aquatic life **5 Points**	Same as Acute. **5 Points**
Chemical-Specific Data	Reasonable potential for limits for no substances based on ATC; Arsenic, copper and chloride detected. Additional Compounds of Concern: 0 **3 Points**	Reasonable potential limits for no substances based on CTC; Arsenic, copper and chloride detected. Additional Compounds of Concern: 0 **3 Points**
Additives	1 Biocide and 1 Water Quality Conditioner added. No P treatment. **4 Points**	Additives used more than once per 4 days. **4 Points**
Discharge Category	Stream electric power generating **0 Points**	Same as Acute. **0 Points**
Wastewater Treatment	Primary Treatment Only **8 Points**	Same as Acute. **8 Points**
Downstream Impacts	No impacts known **0 Points**	Same as Acute. **0 Points**
Total Checklist Points:	**25 Points**	**25 Points**
Recommended Monitoring Frequency (from Checklist):	3/permit term	3/permit term
Limit Required?	No	No

	Acute	Chronic
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, 3/permit term acute and chronic WET tests 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).

Outfall 010: Outfall 010 is comprised primarily of raw Lake Michigan water with very minimal discharge. The discharge does not have a history of WET failures and no toxic compounds are expected at levels of concern. Since there is believed to be a very low risk of toxicity, WET testing is not recommended during the reissued permit term.

PART 8 – ADDITIVE REVIEW

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

Additive Parameters

Additive Name	Manufacturer	Purpose of Additive including where added	Intermittent or Continuous Feed	Frequency of Use		Dosage rate mg/L	Potential Use Restriction mg/L[1]
				Months per/yr.	Days/ week		
Sumalchlor 50	Summit Chemical	Pre-treatment	Continuous	12	7	<1.0	1.01 average
Aqua Hawk 607	Hawkins, Inc	Pre-treatment	Continuous	12	7	1.0	7.0
Sodium bisulfite[2]	Acros Organics	Dechlorinate for zebra mussel control	Intermittent				
GDS-12	Benetech	Dust suppressant	Intermittent			Unknown-trace amount	0.0128
Sodium hypochlorite[2]	Rowell Chemical Corp	Zebra mussel control	Intermittent				
Superfloc C-1592RS	Kemira	Flocculent	Continuous	12	7	1.0	0.118

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

Secondary values are not calculated for the sodium hypochlorite and sodium bisulfite additives, because these substances will be regulated by the total residual chlorine limit.

Sumachlor 50 is proposed to be dosed at a rate of 1.0 mg/L for pretreatment at the water treatment plant. Wastewaters from several other sources are mixed with this prior to discharge to Outfall 009. Because of this, the actual expected discharge concentration would be much less than 1.0 mg/L and this additive is approved at the proposed dosage rate.

Aqua Hawk 607 is proposed to be dosed at a rate of 1.0 mg/L for pretreatment at the water treatment plant and the calculated discharge concentration limit is 7.0 m/L. Other wastewaters are mixed with this as well prior to discharge to Outfall 009, making the effluent concentration even lower, so the additive is approved at the proposed dosage rate.

Superfloc C-1592RS is proposed to be dosed at a rate of 1.0 mg/L. This is discharged through Outfall 003 (Sample Point 107). Effluent from Outfall 003 is mixed with Outfalls 004 and 009 in a comingled channel which provides significant dilution prior to discharge to Lake Michigan. The flow from 009 is thousands of times greater than 003 on average, so the effluent concentration is expected to be significantly lower than the calculated effluent limit, therefore the additive is approved at the proposed dosage rate.

Attachment #2

Temperature limits for receiving waters without unidirectional flow

(calculation using default ambient temperature data)

Facility: Manitowoc Public Utilities

Outfall(s): 010

Date Prepared: 12/2/2022

Design Flow (Qe): 0.0003 MGD

Lake Type: Lake Michigan waters - Nort

Discharge Type: Great Lakes shore discharge

Maximum area of mixing zone allowed (coefficient "A"): 3,125,000 ft^2

Month	Water Quality Criteria			Representative Highest Effluent Flow Rate (Qe)		B	e^{-a} (for SL-WQBEL)	e^{-a} (for A-WQBEL)	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)	(MGD)	(MGD)				(°F)	(°F)	(°F)	(°F)
JAN	34	43	69	0.02	0.11	0.405	0.000	0.000			NA	120
FEB	33	47	69	0.02	0.11	0.405	0.000	0.000			NA	120
MAR	35	52	69	0.02	0.11	0.405	0.000	0.000			NA	120
APR	39	58	70	0.02	0.11	0.405	0.000	0.000			NA	120
MAY	44	64	71	0.02	0.11	0.405	0.000	0.000			NA	120
JUN	48	69	72	0.02	0.11	0.405	0.000	0.000			NA	120
JUL	53	71	73	0.02	0.11	0.405	0.000	0.000			NA	120
AUG	56	69	73	0.02	0.11	0.405	0.000	0.000			NA	120
SEP	53	64	73	0.02	0.11	0.405	0.000	0.000			NA	120
OCT	48	55	72	0.02	0.11	0.405	0.000	0.000			NA	120
NOV	42	47	70	0.02	0.11	0.405	0.000	0.000			NA	120
DEC	36	44	69	0.02	0.11	0.405	0.000	0.000			NA	120

Attachment #2

Temperature limits for receiving waters without unidirectional flow

(calculation using default ambient temperature data)

Facility: Manitowoc Public Utilities

Outfall(s): 003

Date Prepared: 11/29/2022

Design Flow (Qe): 0.052 MGD

Lake Type: Lake Michigan waters - Nort

Discharge Type: Great Lakes shore discharge

Maximum area of mixing zone allowed (coefficient "A"): 3,125,000 ft^2

Month	Water Quality Criteria			Representative Highest Effluent Flow Rate (Qe)		B	e^{-a} (for SL-WQBEL)	e^{-a} (for A-WQBEL)	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)	(MGD)	(MGD)				(°F)	(°F)	(°F)	(°F)
JAN	34	43	69	0.00	0.00	0.405	0.000	0.000			NA	120
FEB	33	47	69	0.00	0.00	0.405	0.000	0.000			NA	120
MAR	35	52	69	0.00	0.02	0.405	0.000	0.000			NA	120
APR	39	58	70	0.00	0.00	0.405	0.000	0.000			NA	120
MAY	44	64	71	0.00	0.03	0.405	0.000	0.000			NA	120
JUN	48	69	72	0.00	0.03	0.405	0.000	0.000			NA	120
JUL	53	71	73	0.00	0.00	0.405	0.000	0.000			NA	120
AUG	56	69	73	0.00	0.00	0.405	0.000	0.000			NA	120
SEP	53	64	73	0.00	0.00	0.405	0.000	0.000			NA	120
OCT	48	55	72	0.00	0.00	0.405	0.000	0.000			NA	120
NOV	42	47	70	0.00	0.00	0.405	0.000	0.000			NA	120
DEC	36	44	69	0.00	0.00	0.405	0.000	0.000			NA	120

Attachment #2

Temperature limits for receiving waters without unidirectional flow

(calculation using default ambient temperature data)

Facility: Manitowoc Public Utilities

Outfall(s): 004

Date Prepared: 12/2/2022

Design Flow (Qe): 0.052 MGD

Lake Type: Lake Michigan waters - Nort

Discharge Type: Great Lakes shore discharge

Maximum area of mixing zone allowed (coefficient "A"): 3,125,000 ft^2

Month	Water Quality Criteria			Representative Highest Effluent Flow Rate (Qe)					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)	B	e^{-a} (for SL-WQBEL)	e^{-a} (for A-WQBEL)	Weekly Average	Daily Maximum	**Weekly Average Effluent Limitation**	**Daily Maximum Effluent Limitation**
	(°F)	(°F)	(°F)	(MGD)	(MGD)				(°F)	(°F)	(°F)	(°F)
JAN	34	43	69	0.06	0.06	0.405	0.000	0.000	57	57	NA	120
FEB	33	47	69	0.05	0.05	0.405	0.000	0.000	59	59	NA	120
MAR	35	52	69	0.06	0.06	0.405	0.000	0.000	66	66	NA	120
APR	39	58	70	0.04	0.04	0.405	0.000	0.000	60	60	NA	120
MAY	44	64	71	0.06	0.06	0.405	0.000	0.000	66	66	NA	120
JUN	48	69	72	0.05	0.05	0.405	0.000	0.000	60	60	NA	120
JUL	53	71	73	0.04	0.04	0.405	0.000	0.000	67	67	NA	120
AUG	56	69	73	0.07	0.07	0.405	0.000	0.000	71	71	NA	120
SEP	53	64	73	0.05	0.05	0.405	0.000	0.000	68	68	NA	120
OCT	48	55	72	0.03	0.03	0.405	0.000	0.000	53	53	NA	120
NOV	42	47	70	0.06	0.06	0.405	0.000	0.000	47	47	NA	120
DEC	36	44	69	0.08	0.08	0.405	0.000	0.000	62	62	NA	120

Attachment #2

Temperature limits for receiving waters without unidirectional flow

(calculation using default ambient temperature data)

Facility: Manitowoc Public Utilities

Outfall(s): 009

Date Prepared: 12/2/2022

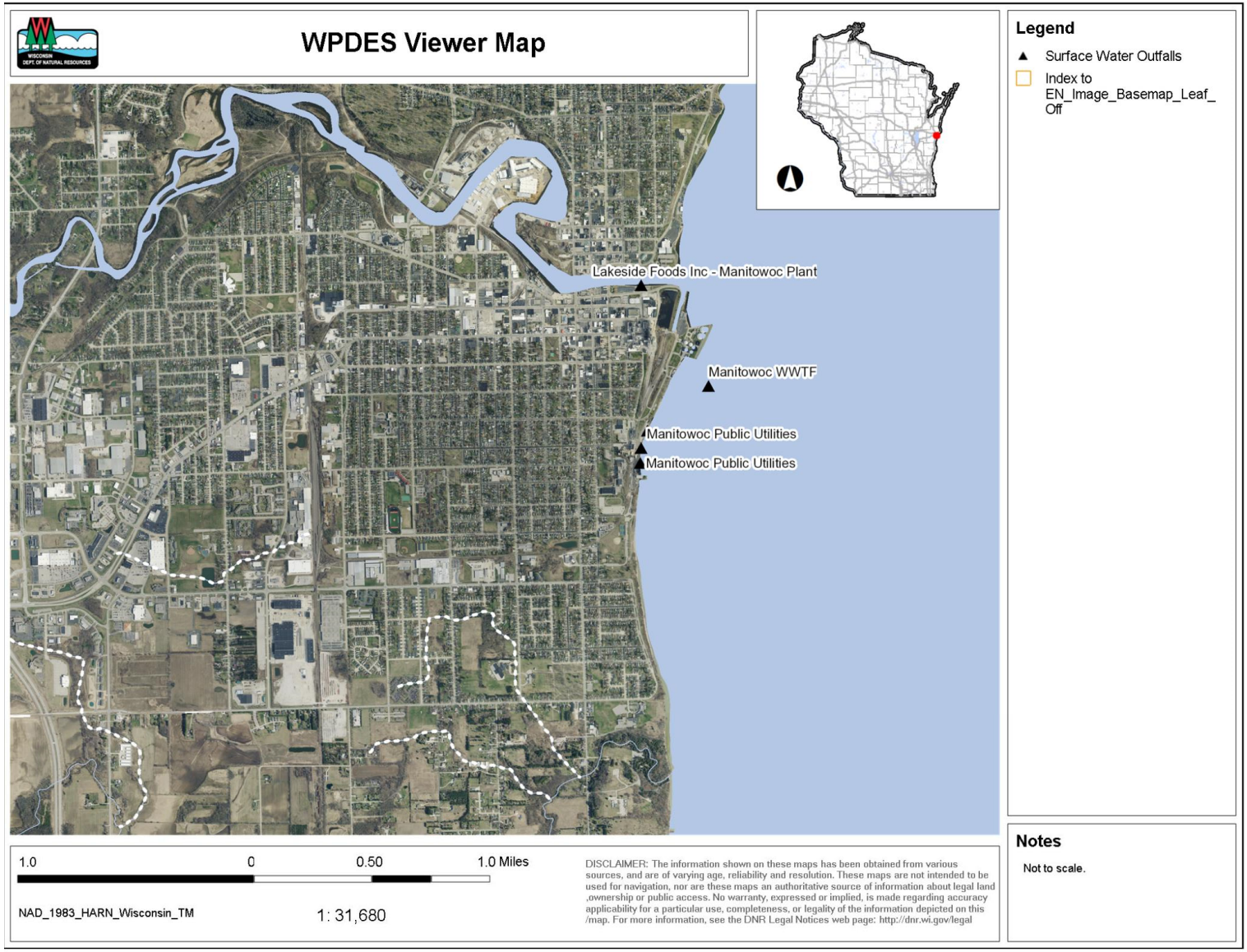
Design Flow (Qe): 56 MGD

Lake Type: Lake Michigan waters - Nort

Discharge Type: Great Lakes shore discharge

Maximum area of mixing zone allowed (coefficient "A"): 3,125,000 ft^2

Month	Water Quality Criteria			Representative Highest Effluent Flow Rate (Qe)		B	e^{-a} (for SL-WQBEL)	e^{-a} (for A-WQBEL)	Representative Highest Monthly Effluent Temperature Outfall 109		**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)	(MGD)	(MGD)				(°F)	(°F)	(°F)	(°F)
JAN	34	43	69	58.01	69.23	0.405	0.475	0.536	72	78	53	99
FEB	33	47	69	59.59	66.35	0.405	0.484	0.521	71	77	62	102
MAR	35	52	69	57.96	68.90	0.405	0.474	0.534	65	73	71	99
APR	39	58	70	42.01	54.76	0.405	0.357	0.454	56	68	92	107
MAY	44	64	71	66.65	71.83	0.405	0.523	0.548	80	86	82	93
JUN	48	69	72	62.78	75.50	0.405	0.502	0.564	80	82	90	91
JUL	53	71	73	74.05	84.71	0.405	0.558	0.600	92	98	85	86
AUG	56	69	73	88.40	89.56	0.405	0.613	0.617	94	97	77	84
SEP	53	64	73	90.60	92.43	0.405	0.621	0.626	93	95	71	85
OCT	48	55	72	66.20	66.79	0.405	0.520	0.523	88	91	61	94
NOV	42	47	70	67.20	68.53	0.405	0.526	0.532	78	84	52	95
DEC	36	44	69	73.15	86.92	0.405	0.554	0.608	65	71	50	90


WPDES Viewer Map
Legend
Surface Water Outfalls
Index to EN_Image_Basemap_Leaf_Off
Lakeside Foods Inc - Manitowoc Plant
Manitowoc WWTF
Manitowoc Public Utilities
Manitowoc Public Utilities
1.0
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NAD_1983_HARN_Wisconsin_TM
1: 31,680
DISCLAIMER: The information shown on these maps has been obtained from various sources, and are of varying age, reliability and resolution. These maps are not intended to be used for navigation, nor are these maps an authoritative source of information about legal land ,ownership or public access. No warranty, expressed or implied, is made regarding accuracy applicability for a particular use, completeness, or legality of the information depicted on this /map. For more information, see the DNR Legal Notices web page: http://dnr.wi.gov/legal
Notes
Not to scale.

Wisconsin Department of Natural Resources

Cooling Water Intake Structure Best Technology Available Determination

Manitowoc Public Utilities – Manitowoc Generating Station

S. Hanson – Wastewater Engineer
January 23, 2024

Executive Summary

In conformity with Section 316(b) of the Clean Water Act, the location, design, construction, and capacity of cooling water intake structures should reflect the best technology available (BTA) for minimizing adverse environmental impacts. The department has made a Best Technology Available (BTA) determination for one cooling water intake structure (CWIS) utilized by Manitowoc Public Utilities (MPU) Manitowoc Generating Station (MGS) in accordance with ch. NR 111, Wis. Adm. Code. The BTA for the CWIS is based on the required information submitted for a facility that withdraws greater than 2 MGD Design Intake Flow (DIF) and uses at least 25% of the total water withdrawn for cooling purposes. MGS 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 the only CWIS that is currently BTA for achieving the maximum reduction in impingement mortality is the RWPS 2 CWIS.

Due to three of the four existing CWIS not currently complying with any of the impingement mortality BTA standards listed under s. NR 111.12(1), Wis. Adm. Code the department has included a schedule in the permit in order to provide MGS with adequate time to bring the three intakes into compliance with the impingement mortality BTA standards.

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 existing technologies employed by MGS represent the best technology available in order to achieve the maximum reduction in entrainment.

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

Background Information

MGS is located at 1303 S 8th St, Manitowoc, WI, which is approximately 450 ft north of Manitowoc Lincoln High School and 500 ft west of Lake Michigan. MGS utilizes three steam turbine-generator units that are fueled by coal, petroleum coke, or paper pellets, one natural gas auxiliary boiler, and one diesel generator unit that can burn fuel oil or natural gas. The intakes used by MGS are also utilized by the municipal drinking water system.

There are four CWIS in use at MGS. Two of the CWIS supply water to the Power Plant Pump House, one supplies water to the Raw Water Pump System 1 (RWPS1), and the other CWIS supplies water to the

Raw Water Pump System 2 (RWPS 2). The Power Plant Pump House has a design intake flow (DIF) of 52 million gallons per day (MGD). The RWPS 1 CWIS has a DIF of 75 MGD, however at low lake level the RWPS 1 CWIS can only withdraw water up to approximately 40 MGD. The RWPS 2 CWIS has a DIF of 56 MGD.

Intake Velocity Calculation

For the last permit term intake velocities were calculated at the points where water is withdrawn from Lake Michigan instead of at all points between where water is withdrawn from Lake Michigan and the first screen or other structure that has a mesh with a maximum distance in the openings of 0.56 inches as required under s. NR 111.03(26), Wis. Adm. Code.

For the design and configuration of the RWPS 2 CWIS (56 MGD DIF), the calculated design intake velocity (v) is:

$$v = (total\ pump\ rate\ MGD) \times (1{,}000{,}000) \times \left(\frac{1\ day}{24\ hours}\right) \times \left(\frac{1\ hour}{60\ min}\right) \times \left(\frac{1\ min}{60\ sec}\right) \times \left(\frac{0.1337\ ft^3}{gal}\right) \times \left(\frac{1}{total\ open\ area\ of\ screen}\right)$$

$$v = (56) \times (1{,}000{,}000) \times \left(\frac{1}{24}\right) \times \left(\frac{1}{60}\right) \times \left(\frac{1}{60}\right) \times (0.1337) \times \left(\frac{1}{327}\right)$$

$$v = 0.27\ {}^{ft}/_{sec}$$

Where:

$smallest\ total\ open\ area\ of\ intake$ = $\#\ of screens \times overall\ area \times open\ area\ \%/100$

$smallest\ total\ open\ area\ of\ intake$ = 4 screens x 2 x π x 2.5 ft x 6 ft x 86.77%/100

$smallest\ total\ open\ area\ of\ intake$ = 327 ft^2

Open area based on cylindrical screens with 3/8-inch-wide slots produced by Johnson Screen

For the design and configuration of the RWPS 1 CWIS (75 MGD DIF), the calculated design intake velocity (v) is:

$$v = (total\ pump\ rate\ MGD) \times (1{,}000{,}000) \times \left(\frac{1\ day}{24\ hours}\right) \times \left(\frac{1\ hour}{60\ min}\right) \times \left(\frac{1\ min}{60\ sec}\right) \times \left(\frac{0.1337\ ft^3}{gal}\right) \times \left(\frac{1}{total\ open\ area\ of\ screen}\right)$$

$$v = (75) \times (1{,}000{,}000) \times \left(\frac{1}{24}\right) \times \left(\frac{1}{60}\right) \times \left(\frac{1}{60}\right) \times (0.1337) \times \left(\frac{1}{12.6}\right)$$

$$v = 9.2\ {}^{ft}/_{sec}$$

Where:

$smallest\ total\ open\ area\ of\ intake = overall\ area \times open\ area\ \%/100$

$smallest\ total\ open\ area\ of\ intake$ = π x (2 ft)^2 x 100%/100

$smallest\ total\ open\ area\ of\ intake$ = 12.6 ft^2

Open area based on an open pipe with a 48-inch diameter

For the design and configuration of the Eastern Rock Crib CWIS (26 MGD DIF), the calculated design intake velocity (v) is:

$$v = (total\ pump\ rate\ MGD) \times (1{,}000{,}000) \times \left(\frac{1\ day}{24\ hours}\right) \times \left(\frac{1\ hour}{60\ min}\right) \times \left(\frac{1\ min}{60\ sec}\right) \times \left(\frac{0.1337\ ft^3}{gal}\right) \times \left(\frac{1}{total\ open\ area\ of\ screen}\right)$$

$$v = (26) \times (1{,}000{,}000) \times \left(\frac{1}{24}\right) \times \left(\frac{1}{60}\right) \times \left(\frac{1}{60}\right) \times (0.1337) \times \left(\frac{1}{7.1}\right)$$

$$v = 5.7\ {}^{ft}/_{sec}$$

Where:

$smallest\ total\ open\ area\ of\ intake = overall\ area \times open\ area\ \%/100$

$smallest\ total\ open\ area\ of\ intake$ = π x (1.5 ft)^2 x 100%/100

$smallest\ total\ open\ area\ of\ intake$ = 7.1 ft^2

Open area based on an open pipe with a 36-inch diameter

For the design and configuration of the Western Rock Crib CWIS (26 MGD DIF), the calculated design intake velocity (v) is:

$$v = (total\ pump\ rate\ MGD) \times (1{,}000{,}000) \times \left(\frac{1\ day}{24\ hours}\right) \times \left(\frac{1\ hour}{60\ min}\right) \times \left(\frac{1\ min}{60\ sec}\right) \times \left(\frac{0.1337\ ft^3}{gal}\right) \times \left(\frac{1}{total\ open\ area\ of\ screen}\right)$$

$$v = (26) \times (1{,}000{,}000) \times \left(\frac{1}{24}\right) \times \left(\frac{1}{60}\right) \times \left(\frac{1}{60}\right) \times (0.1337) \times \left(\frac{1}{12.6}\right)$$

$$v = 3.2\ {}^{ft}/_{sec}$$

Where:

$$smallest\ total\ open\ area\ of\ intake = overall\ area \times open\ area\ \%/100$$

$$smallest\ total\ open\ area\ of\ intake = \pi \text{ x } (2 \text{ ft})^2 \text{ x } 100\%/100$$

$$smallest\ total\ open\ area\ of\ intake = 12.6\ ft^2$$

Open area based on an open pipe with a 48-inch diameter

Intake Structure Description

Two rock crib intakes are used to supply water to the Power Plant Pump House. Both rock cribs are approximately 20 feet under the surface of Lake Michigan and extend above the surface of the lake. The western crib is located approximately 1,700 feet offshore and the eastern crib is located approximately 2,200 feet offshore. The eastern crib has 40 foot square footprint and consists of lattice made of 12-inch by 12-inch lumber filled with "one-man" stones. The western crib has an octagonal footprint with alternating sides of 24- and 8-feet. The western crib is made of stones confined within 120 pilings with 2 inches in between each piling.

The RWPS 1 intake is located 9,000 feet offshore at a depth of 40 feet. The intake consists of three inverted cones that extend 4 to 5 feet above the bottom of the lake. Each cone has a 11.5 foot diameter and is covered with grates made of 0.5 inch wide bars spaced 6-inches on center. The cones are connected to a 48-inch diameter pipe that conveys water to two pump wells. One pump well contains two pumps each rated at 16,200 gallons per minute (gpm) and supplies water to MGS's steam condensers and the municipal water supply's SMF unit. The second pump well contains three pumps rated at 5,000, 7,000, and 7,200 gpm and supplies water to the municipal water supply system's high-pressure, continuous membrane filtration (CMF) unit.

The RWPS 2 intake is located 4,000 feet offshore in an area where the lake is approximately 30 feet deep. The intake is made of two cylindrical wedgewire screens with 3/8-inch-wide slots. Each screen has a 60-inch diameter and are 17.45 feet long. After the screens the water passes through a 60-inch diameter pipe. The DIF is 56 MGD. This intake supplies water to MGS's steam condensers and the municipal water supply system's SMF unit.

Eastern Rock Crib Location: 44°04'43.9"N, 87°38'54.0"W

Western Rock Crib Location: 44°04'45.6"N, 87°39'01.0"W

RWPS 1 Intake Structure Crib Location: 44°04'35.7"N, 87°37'17.7"W

RWPS 2 Intake Structure Crib Location: 44°04'43.7"N, 87°38'26.7"W

Power Plant Pump House Location: 44°04'52.1"N, 87°39'22.3"W

Raw Water System 1 Pump House Location: 44°04'57.8"N, 87°39'17.6"W

Raw Water System 2 Pump House Location: 44°04'57.0"N, 87°39'18.3"W

S. NR111.41, Wis. Adm. Code Application Materials Submitted

As part of the WPDES Permit Application, MGS was required to submit information required under s. NR 111.41(1) through (7) and (13). MGS provided the information required under s. NR 111.41(1) through (7) and (13). The relevant application materials were included in a report titled "122.21(r) Information Report for Manitowoc Generating Station", dated April 7, 2016 and produced by Burns & McDonnell.

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

BTA Standards for Impingement Mortality

In accordance with s. NR 111.12(1)(a), MGS 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.

The permittee selected "0.5 Feet per second maximum design intake velocity" as the option for complying with the BTA standards for impingement mortality for all four intakes. The selected standard is only currently met for the RWPS 2 intake, so the department has included a schedule in this reissuance to provide MGS adequate time to comply with the selected standards at the remaining three intakes.

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 does not recommend the approval of this proposal. Below is a written explanation of the proposed entrainment determination as required by s. NR 111.13(1).

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

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

In 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 addition, the proposed determination may be based on consideration of the following factors listed in s. NR 111.13(3):

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.*

Entrainment reduction technologies and strategies provided in s. NR 111.41(13) include CCRS, fine mesh screens with a mesh size of 2 millimeters or smaller, variable speed pumps, and water reuse or alternate sources of cooling water.

Entrainment Performance Evaluation

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. 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.

Evaluation of Candidate Entrainment Control Technologies

BGS currently does not employ any of the entrainment reduction technologies or strategies listed in s. NR 111.41(13), so the department evaluated all of the listed technologies in order to make the BTA determination.

TECHNOLOGY: Closed-Cycle Recirculating Systems

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).

Closed-cycle recirculating systems (CCRS) can potentially reduce entrainment by reducing the volume of water that is withdrawn. USEPA estimates that freshwater cooling towers, compared to once-through cooling systems, reduce impingement mortality and entrainment by 97.5 percent.

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.

The increase in parasitic loads from the operation of a CCRS may require the burning of additional fuel. By burning additional fuel, an increase in the emission of CO_2, NO_x, SO_2, and mercury would occur.

An increase in PM_{10} emissions may occur from the use of a CCRS due to minerals drying out and turning into fine particles in the drift from the cooling towers.

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.

There is not currently enough land available at MGS for the addition of cooling towers, so nearby land would need to be purchased. The land surrounding MGS is already developed and contains homes and Manitowoc Lincoln High School.

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

There are not currently any plans to retire WGS.

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 largest social cost associated with installing and operating a CCRS is the capital cost, which would increase the electricity rates of consumers. Other social costs include the increasing in icing and fogging, which could make conditions in the surrounding area more hazardous, and an increase in noise pollution. There are several nearby sensitive receptors including Manitowoc Lincoln High School, Pulaski Park, Red Arrow Park, Washington Park, and multiple historically significant places.

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

The cooling tower would reduce the thermal discharge from MGS. MGS however does not currently have reasonable potential to exceed the temperature criteria for Lake Michigan and thus the department does not consider this a significant factor in the BTA determination for MGS' CWIS.

1.7. FACTOR s. NR 111.13(3)(d), Wis. Adm. Code: Impacts on the Reliability of Energy Delivery

Energy would be lost during the process of retrofitting MGS with a cooling tower and due to the energy penalty from parasitic loads and turbine efficiency reduction. The lost energy would however not impact the reliability of energy delivery from the local grid because other nearby facilities would likely be able to make up for energy that was lost.

1.8. Summary/Conclusion.

A CCRS would potentially reduce entrainment due to decreased flows. However, the department has rejected a CCRS as BTA for achieving the maximum reduction in entrainment due to the loss of energy, the increase in the emission of particulates and other pollutants, and the significant differences between the anticipated social costs and benefits.

TECHNOLOGY: Fine Mesh Screens

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

Fine mesh screens can potentially reduce entrainment by physically preventing eggs and larvae from entering the CWIS.

While fine mesh screens may reduce entrainment the eggs and larvae that were previously entrained would most likely become impinged instead.

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.

There would not be any change in the emission of particulate matter from this technology. Dredging may however be required and may cause negative impacts on water quality due to resuspension of sediment. The effects of the resuspension of sediment would likely be worse if the sediment was contaminated.

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

Land availability would not be a concern in the installation of the screens as they would be installed underwater in place of the current intakes.

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

See the section on this factor for CCRS above for details.

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 quantified value for the social benefits provided by this technology was similar to that of CCRS as entrainment would likely be reduced by about 97%.

The only social cost for implementing this technology would come from the resource costs of fine mesh screens.

2.6. FACTOR s. NR 111.13(3)(d), Wis. Adm. Code: Impacts on the Reliability of Energy Delivery

During the installation of the fine mesh screens, downtime will occur at MGS. This downtime is however unlikely to have a significant impact on the reliability of energy delivery since the other power plants that are part of the local grid would likely be able to make up for the loss in energy. Increased clogging of the intake due to ice and debris may occur as well and may cause the facility to shut down until proper maintenance can occur.

2.7. Summary/Conclusion.

The use of fine mesh 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 and dying while on the screen instead and the potential impacts to energy reliability.

TECHNOLOGY: Variable Speed Pumps

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).

Variable speed pumps (VSPs) achieve entrainment reduction by reducing intake flow. In cooler months when the ambient temperature of the water is lower, opportunities for flow reduction or more likely. With the seasonal nature of opportunities for flow reduction seasonal variations in aquatic organisms must be considered in estimating the effectiveness of VSPs for reducing entrainment at a facility.

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.

Changes in the emission of particulates and other pollutants is unlikely to occur with the use of VSPs.

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.

Since VSPs would be installed in place of the current pumps land availability would not be an issue for the use of this technology.

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

See the section on this factor for CCRS above for details.

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.

Since MGS has an AIF of less than 125 MGD a social costs and benefits study was not required. However, the annual quantified social benefit from entirely eliminating entrainment was estimated to be $2,486 and it is expected that the entrainment reductions from the use of one or more VSPs would be small and therefore the annual quantified social benefit would likely be much lower than $2,486. The primary social cost of installing using one or more VSPs is the capital cost of the VSP.

3.6. Summary/Conclusion.

VSPs may reduce entrainment by reducing the intake flow when less water is needed by the facility. However primarily due to the significant differences between the anticipated social costs and benefits the department has rejected VSPs as BTA for achieving the maximum reduction in entrainment.

TECHNOLOGY: Water Reuse or Alternative Sources of Cooling Water

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. The use of another permittee's effluent and the use of a Ranney well are two potential options for alternative sources of cooling water.

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. Other changes in emissions of particulates and other pollutants would likely occur due to lost energy needing to be replaced by other nearby facilities during the process of retrofitting BGS for internal water reuse or the use of an alternative source of cooling water.

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

Land availability would not be a problem for internal reuse, but using another permittee's effluent as an alternative sources of cooling water would require pipelines to be built between BGS and the facility providing the cooling water. Depending on what facility was selected to provide cooling water, the length required for this pipeline would vary as would the land use of the land it would go through. There are 4 permittees with discharges within 5 miles of MGS. The nearest outfall is 0.39 miles northeast and is used by the Manitowoc WWTF. The other potential sources of effluent are Lakeside Foods, Inc. (0.6 miles north), Parker Hannifin Corporation (2.5 miles northwest), and Holy Family Convent WWTF (4.3 miles southwest).

Using groundwater as an alternative source of cooling water would also require a significant amount of land in order to avoid drawdown interference on other nearby wells and to construct the pipeline to transfer water from the wells to BGS.

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

See the section on this factor for CCRS above for details.

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

A social benefits and costs analysis was not done for water reuse or alternative sources of cooling water, however it can be assumed that the cost of using an alternative source of cooling water, as well as the cost of retrofitting BGS for water reuse, would be significantly greater than the benefits that would be gained through their use. Some major costs associated with using alternative sources of cooling water would include the addition of varying levels of pretreatment needed depending on the quality of the water source as well as the cost of the necessary land.

4.6. Summary/Conclusion.

Water reuse and alternative sources of cooling water may reduce entrainment due to the reduction in the required intake flow. However, due to the anticipated significant difference in the costs and benefits associated with the implementation of this technology as well as the lack of available land for the use of an alternative source of cooling water the department has concluded that neither water reuse nor the use of an alternative source are BTA for reducing adverse environmental impacts.

Entrainment BTA Decision

Since no technologies are currently employed by MGS to reduce entrainment other than that the offshore location likely minimizes entrainment by nature of its location, all technologies listed under s. NR 111.41(13) were considered as part of the BTA determination for MGS. From these evaluations it was determined that the existing CWIS is considered the best technology available for MGS to achieve the maximum reduction in entrainment based on the factors specified in s. NR 111.13, Wis. Adm. Code. Various factors went into rejecting the other listed technologies as BTA.

The use of a CCRS was rejected as BTA due to the significant difference in anticipated social costs and benefits as well as the potential increase in the emissions of particulate matter and other pollutants.

Fine mesh screens were rejected as BTA primarily due to organisms that were previously entrained likely becoming impinged and dying while on the screen. The use of fine mesh screens would also increase the potential for the intake to become clogged by ice and debris.

VSPs were rejected as BTA primarily due to the significant differences between the anticipated social costs and benefits.

The use of an alternative source of cooling water would require a significant amount of land for either a pipeline if effluent from a nearby permittee were to be used or for the one or more wells that would need to be installed if groundwater were to be used. This along with the significant anticipated difference in the costs and benefits from the use of alternative source of cooling water led to the department rejecting an alternative source of cooling water as the BTA for entrainment.

The final option that was considered was water reuse. Water reuse was rejected due to there being no opportunities in the current process for water to be reused for cooling purposes.

Summary

1. The permittee proposes to comply with a BTA impingement standard in s. NR 111.12, Wis. Adm. Code, by having a 0.5 Feet per second maximum design intake velocity at all four intakes.
2. The department has concluded that the chosen BTA standard for impingement mortality is only currently met at the RWPS 2 intake.
3. The department is including a schedule for complying with the impingement mortality BTA standards in this permit.
4. After consideration of the factors listed in s. NR 111.13, Wis. Adm. Code, the department has concluded that existing CWIS are considered the best technology available to achieve the maximum reduction in entrainment.
5. BTA determinations will be reviewed at the next reissuance and at subsequent reissuances in accordance with ch. NR 111, Wis. Adm. Code. In subsequent permit reissuance applications, the permittee shall provide all the information required in s. NR 111.4(2)(b),Wis. Adm. Code unless a request to reduce the information required has been submitted by the permittee and accepted by the department, as allowed by s. NR 111.42(1)(a).
6. The BTA includes requirements for monitoring and inspection of the CWIS and other requirements and terms; please see the permit for those requirements.