Permit Fact Sheet

General Information

Permit Number:	WI-0002887-09-0
Permittee Name:	Northern States Power, Wisconsin, d/b/a Xcel
Address:	122 14th Ave W
City/State/Zip:	Ashland, WI 54806
Discharge Location:	Outfalls 001 and 002: 400 ft east of the facility (46°35'17" N 90°53'59" W) Outfall 004: In the Boiler #5 Building (46°35'14" N 90°54'07" W) Outfall 007: West side of the facility on the intake channel (46°35'14" N 90°54'08" W) Outfall 013: West side of the facility near the #5 crib house intake structure (46°35'13" N 90°54'05" W) Outfall 016: Adjacent to the traveling screens (46°35'16" N 90°54'08" W) Outfall 017: West side of the facility near the #5 crib house intake structure (46°35'14" N 90°54'06" W) Outfall 018: North side of the facility near the #6 crib house intake structure (46°35'16" N 90°54'08" W)
Receiving Water:	Chequamegon Bay of Lake Superior
StreamFlow ($Q_{7,10}$):	N/A
Stream Classification:	Cold water community, public water supply, and outstanding resource water
Discharge Type:	Existing

Facility Description

The Northern States Power Company – Bay Front Plant (NSPC – Bay Front Plant) is a 44-megawatt steam electric generating plant that burns wood chips, railroad ties, tire-derived fuel, and natural gas. The plant uses three boilers and three turbine generators connected by a common header system. Any one boiler or combination of boilers can provide steam to any one or all turbine generators. The facility uses intake water from Lake Superior to cool the turbine steam.

There were three main outfalls (001, 002, and 003) during the past reissuance that discharged condenser cooling water, noncontact cooling water and process water. As of January 2015, coal is no longer burned in Boiler #5. In addition to the process water that was once discharged via 003, the discharge from Outfall 001 is comprised of turbine condenser cooling water, or once through cooling water (it goes through the condenser system only once and does not contain water conditioning additives), various other cooling waters, boiler drawdown, and blow off water. Other condenser cooling waters are discharged through Outfall 002 near Outfall 001. Outfall 004 was for bypass discharges during emergencies and scheduled maintenance for Outfall 003. With the rerouting of the waste, Outfall 004 is now associated with bypass discharges of the collection tank. All discharges are to Chequamegon Bay in Lake Superior.

Other outfalls (007 and 013) discharge only noncontact cooling water with no additives at various locations. Outfall 015 is a calculated sampling point for the combined discharge mass limits from the collection tank (Outfall 103 and 004). Outfall 016 monitors the flow rate of the existing lake water directed to clean debris from the traveling screen across the mouth of the inlet slip. Outfalls 017 and 018 monitor the flow rate of the existing warm condenser water diverted prior to discharge from Outfalls 001 and 002 respectively used to de-ice the intake screens in the winter.

Substantial Compliance Determination

After a desk top review of all discharge monitoring reports, compliance schedule items, and a site visit on **8/29/24**, this facility has been found to be in substantial compliance with their current permit.

Compliance determination entered by Eric de Venecia, Wastewater Engineer on 9/14/2024.

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	Representative samples shall be collected from the intake service water from Unit 5 intake for Outfall 001.
703	N/A	Representative samples shall be collected from the intake service water from Unit 6 intake for Outfall 002.
704	Maximum Design Intake: 68.5 MGD Average Intake: 30.47 MGD	Trash racks and traveling screens located at end of the 605 foot long channel.
001	Maximum Day: 52.21 MGD[1] Maximum 7-Day Average: 51.77 MGD[1] Maximum 30-Day Average: 37.41 MGD[1] Maximum Annual Average: 18.46 MGD[1]	Representative samples shall be collected prior to discharge to Chequamegon Bay of Lake Superior. This outfall is authorized to discharge condenser cooling water, boiler drawdown and blow off water, water used to fill the boiler and produce steam, reverse osmosis unit concentrate, all floor drains, engine and cooling water from the fire pump weekly operational tests, and various sump and cooling.
002	Maximum Day: 40.6 MGD[1] Maximum 7-Day Average: 31.25 MGD[1] Maximum 30-Day Average: 28.43 MGD[1] Maximum Annual Average: 16.25 MGD[1]	Representative samples shall be collected prior to discharge to Chequamegon Bay of Lake Superior. This outfall is authorized to discharge condenser cooling water.
004	No flow during previous permit term	Representative samples shall be collected prior to discharge to Chequamegon Bay of Lake Superior. This outfall is authorized to discharge overflow from collection tank overflow only during emergencies and scheduled maintenance.
007	Maximum 30-Day average: 0.065 MGD[1] Maximum Annual Average: 0.065 MGD	Representative samples shall be collected prior to discharge to Chequamegon Bay of Lake Superior. This outfall is authorized to discharge noncontact service water.

[1] Data submitted on "Wisconsin Pollutant Discharge Elimination System (WPDES) Wastewater Discharge Individual Permit Application" (Form 3400-178) by Northern States Power Company's Bay Front Generating Station

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)**
013	Maximum 30-Day average: 0.0232 MGD[1] Maximum Annual Average: 0.0232 MGD	Representative samples shall be collected prior to discharge to Chequamegon Bay of Lake Superior. This outfall is authorized to discharge noncontact service water.
015	N/A	When there is a discharge event, the mass limits for oil and grease and total suspended solids apply to the combined flows from sample points 103 and 004. Whenever possible sampling shall occur on the same day as the bypass event.
016	Maximum 30-Day total: 3000 gpd[1]	Flow volume shall be estimated prior to discharge to Chequamegon Bay of Lake Superior. This outfall is authorized to discharge lake water to clear the intake traveling screens located across the inlet slip.
017	Maximum 30-Day total: 1.44 MGD[1]	Flow volume shall be estimated prior to discharge to Chequamegon Bay of Lake Superior. This outfall is authorized to discharge warm water from condenser #5 prior to the sump pit for Outfall 001 in order to de-ice the #5 crib house intake screen in the winter.
018	Maximum 30-Day average: 2.44 MG/month[1]	Flow volume shall be measured prior to discharge to Chequamegon Bay of Lake Superior. This outfall is authorized to discharge warm cooling water from condenser #6 in order to de-ice the # 6 crib house and traveling intake screens in the winter.
101	Maximum Day: 0.016 MGD Discharged 27 times during previous permit term	Representative samples shall be collected at the boiler drawdown sample point for Boilers #1 and 2, prior to mixing with condenser cooling water and other wastestreams discharging at Outfall 001.
102	N/A	At least one field blank shall be collected for each day a sample of mercury is collected from Outfall 001. The purpose of the field blank is to determine whether the field or sample transporting procedures and environments have contaminated the sample.
103	Maximum Day: 0.089 MGD Maximum 7-Day Average: 0.088 MGD Maximum 30-Day Average: 0.087 MGD Maximum Annual Average: 0.074 MGD	Representative samples shall be collected immediately downstream of the collection tank, prior to mixing with the other wastestreams discharging at Outfall 001. Wastes collected in the collection tank include: process water from the package boiler condensate drain, reverse osmosis unit concentrate, all floor drains, engine and cooling water from the fire pump weekly operational tests, and various sump and cooling waters.

1 Influent – Cooling Water Intake Structure - Proposed Monitoring

Sampling Point 702 – UNIT 5 INFLUENT; 703- UNIT 6 INFLUENT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Temperature Maximum		deg F	Daily	Continuous	
Phosphorus, Total		mg/L	Monthly	Grab	

Changes from Previous Permit:

Temperature – Average and minimum temperature monitoring removed

Explanation of Limits and Monitoring Requirements

Temperature

Average and minimum temperature monitoring requirements have been removed due to them being unnecessary for the purpose of calculating limits.

Phosphorus

Data on background phosphorus will help determine what the background concentrations are and will help determine whether limits are necessary in upcoming permit reissuances. Paired samples of water intake and effluent samples collected at the same time are suggested.

Sample Point Number: 704- INTAKE AT CHANNEL

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

Changes from Previous Permit

The department has concluded that no changes are necessary.

Explanation of Limits and Monitoring Requirements

Future BTA

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.

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: 101- BOILER DRAWDN PRIOR TO MIXING

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Per Occurrence	Estimated	Monitoring is required at each boiler drawdown event.
Suspended Solids, Total	Daily Max	100 mg/L	Per Occurrence	Composite	Monitoring is required at each boiler drawdown event.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Suspended Solids, Total	Monthly Avg	30 mg/L	Per Occurrence	Composite	Monitoring is required at each boiler drawdown event.
Oil & Grease (Hexane)	Daily Max	20 mg/L	Per Occurrence	Grab	Monitoring is required at each boiler drawdown event.
Oil & Grease (Hexane)	Monthly Avg	15 mg/L	Per Occurrence	Grab	Monitoring is required at each boiler drawdown event.

Changes from Previous Permit:

TSS and Oil & Grease – Monthly average limits added

Explanation of Limits and Monitoring Requirements

TSS and Oil & Grease

Monthly concentration limits have been added in accordance with s. NR 290.12, Wis. Adm. Code.

Sample Point Number: 102- PROCESS EFFLUENT FIELD BLANK

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Mercury, Total Recoverable		ng/L	Quarterly	Blank	Field blank for mercury sampling at Outfall 001

Changes from Previous Permit:

The department has concluded that no changes are necessary.

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. Therefore, the permit retains the sampling of a field blank for total recoverable mercury for this purpose.

Sample Point Number: 103- COLLECTION TANK BEFORE MIXING

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

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Suspended Solids, Total	Daily Max	100 mg/L	Weekly	Grab	
Suspended Solids, Total	Monthly Avg	30 mg/L	Weekly	Grab	
Suspended Solids, Total		lbs/day	Weekly	Calculated	Applicable mass limits for the combined flows from Sample Points 103 and 004 are found under Outfall 015.
Oil & Grease (Hexane)	Daily Max	20 mg/L	Weekly	Grab	
Oil & Grease (Hexane)	Monthly Avg	15 mg/L	Weekly	Grab	
Oil & Grease (Hexane)		lbs/day	Weekly	Calculated	Applicable mass limits for the combined flows from Sample Points 103 and 004 are found under Outfall 015.

Changes from Previous Permit:

The department has concluded that no changes are necessary.

Explanation of Limits and Monitoring Requirements

Representative samples taken downstream from the collection tank satisfy compliance monitoring for categorical limits (O&G and TSS) that were once sampled via outfall 003. The Limitations are categorical, per Ch. 290, Wis. Adm. Code.

3 Surface Water - Monitoring and Limitations

Sample Point Number: 001- CONDENSER COOLING WATER

100					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
pH Field	Daily Max	9.0 su	Weekly	Grab	
pH Field	Daily Min	6.0 su	Weekly	Grab	
Chlorine, Total Residual		ug/L	Monthly	Grab	
Phosphorus, Total	6-Month Avg	0.6 mg/L	Monthly	Grab	

100					
Temperature Minimum		deg F	Daily	Continuous	
Mercury, Total Recoverable	Daily Max	5 ng/L	Quarterly	Grab	
Arsenic, Total Recoverable		ug/L	2/Year	Grab	
PFOS		ng/L	Monthly	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
PFOA		ng/L	Monthly	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
Additive – Tri-Act 1800	Daily Max	2 gpd	Daily	Calculated	Calculate from daily dosage records
Additive - Eliminox	Daily Max	64 gpd	Daily	Calculated	Calculate from daily dosage records
Acute WET		TUa	Annual	See Listed Qtr(s)	
Chronic WET		TUc	Annual	See Listed Qtr(s)	
pH (Continuous)			Daily	Continuous	Continuous monitoring required starting 04/01/2027. See "Continuous pH Monitoring" below for pH limits and allowed excursions

Changes from Previous Permit

pH – Monitoring switched from weekly grab samples to daily continuous samples

Chlorine – Monthly monitoring added

Phosphorus – 6-month average limit added

Temperature – Average and minimum temperature monitoring removed

Mercury – Daily max limit added

PFOS and PFOA – Monthly monitoring is included in the permit in accordance with s. NR 106.98(2)(d), Wis. Adm. Code.

Additives – Daily max limits added

Acute and Chronic WET – Annual monitoring added in rotating quarters (see permit for quarters in which monitoring is required).

Explanation of Limits and Monitoring Requirements

WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated 9/26/2024 used for this reissuance.

Temperature

Average and minimum temperature monitoring requirements have been removed due to them being unnecessary for the purpose of calculating limits.

Chlorine

Monthly chlorine monitoring has been included in this permit since the current discharge does not have reasonable potential to exceed the WQC and therefore limits have not been included, however the WQBEL memo recommended at least monthly monitoring of chlorine due to the elevated presence of chlorine in the source water.

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: 002- CONDENSER COOLING WATER

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
Temperature Maximum		deg F	Daily	Continuous	
pH Field	Daily Max	9.0 su	Weekly	Grab	
pH Field	Daily Min	6.0 su	Weekly	Grab	
Arsenic, Total Recoverable		ug/L	2/Year	Grab	
Chlorine, Total Residual		ug/L	Monthly	Grab	
pH (Continuous)			Daily	Continuous	Continuous monitoring required starting

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					04/01/2027. See "Continuous pH Monitoring" below for pH limits and allowed excursions

Changes from Previous Permit

Temperature – Average and minimum temperature monitoring removed

pH – Monitoring switched from weekly grab samples to daily continuous samples

Chlorine – Monthly monitoring added

Explanation of Limits and Monitoring Requirements

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated 9/26/2024 used for this reissuance.

Temperature

Average and minimum temperature monitoring requirements have been removed due to them being unnecessary for the purpose of calculating limits.

pH

The sample type for pH has been changed to continuous in this reissuance in order to bring it up to the standard frequency and sample types for pH on a continuous discharge.

Chlorine

Monthly chlorine monitoring has been included in this permit since the current discharge does not have reasonable potential to exceed the WQC and therefore limits have not been included, however the WQBEL memo recommended at least monthly monitoring of chlorine due to the elevated presence of chlorine in the source water.

Sample Point Number: 004- BYPASS PROCESS WATER

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	At Discharge	Estimated	
pH Field	Daily Max	9.0 su	At Discharge	Grab	
pH Field	Daily Min	6.0 su	At Discharge	Grab	
Suspended Solids, Total	Daily Max	100 mg/L	At Discharge	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Suspended Solids, Total	Monthly Avg	30 mg/L	At Discharge	Composite	
Suspended Solids, Total		lbs/day	At Discharge	Calculated	
Oil & Grease (Hexane)	Daily Max	20 mg/L	At Discharge	Grab	
Oil & Grease (Hexane)	Monthly Avg	15 mg/L	At Discharge	Grab	
Oil & Grease (Hexane)		lbs/day	At Discharge	Calculated	
Temperature Maximum		deg F	At Discharge	Grab	
Phosphorus, Total		mg/L	At Discharge	Grab	

Changes from Previous Permit

The department has concluded that no changes are necessary.

Explanation of Limits and Monitoring Requirements

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated 9/24/2024 used for this reissuance.

Sample Point Number: 007- NONCONTACT SERVICE WATER

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Monthly	Estimated	
Chlorine, Total Residual		ug/L	Monthly	Grab	

Changes from Previous Permit

Chlorine – Monthly monitoring added

Explanation of Limits and Monitoring Requirements

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated 9/24/2024 used for this reissuance.

Chlorine

Monthly chlorine monitoring has been included in this permit since the current discharge does not have reasonable potential to exceed the WQC and therefore limits have not been included, however the WQBEL memo recommended at least monthly monitoring of chlorine due to the elevated presence of chlorine in the source water.

Sample Point Number: 013- NONCONTACT SERVICE WATER

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Monthly	Estimated	
Chlorine, Total Residual		ug/L	Monthly	Grab	

Changes from Previous Permit

Chlorine – Monthly monitoring added

Explanation of Limits and Monitoring Requirements

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated 9/24/2024 used for this reissuance.

Chlorine

Monthly chlorine monitoring has been included in this permit since the current discharge does not have reasonable potential to exceed the WQC and therefore limits have not been included, however the WQBEL memo recommended at least monthly monitoring of chlorine due to the elevated presence of chlorine in the source water.

Sample Point Number: 015- COMBINED 103 & 004

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Suspended Solids, Total	Daily Max	74 lbs/day	Weekly	Calculated	
Suspended Solids, Total	Monthly Avg	22 lbs/day	Weekly	Calculated	
Oil & Grease (Hexane)	Daily Max	15 lbs/day	Weekly	Calculated	
Oil & Grease (Hexane)	Monthly Avg	11 lbs/day	Weekly	Calculated	

Changes from Previous Permit

TSS – daily max limit changed from 1268 lbs/day to 74 lbs/day and monthly avg limit changed from 67 lbs/day to 22 lbs/day

Oil & Grease – daily max limit changed from 254 lbs/day to 15 lbs/day and monthly avg limit changed from 33 lbs/day to 11 lbs/day

Explanation of Limits and Monitoring Requirements

TSS and Oil & Grease

Limits were calculated by multiplying the concentrations limits found at s. NR 290.12, Wis. Adm. Code, with the maximum combined flow through sample points 103 and 004.

Sample Point Number: 016- INTAKE SCREEN WASH WATER; 017- DE-ICING RECIRCULATION WATER; 018- DE-ICING RECIRCULATION WATER

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		gpd	Monthly	Measure	

Changes from Previous Permit

The department has concluded that no changes are necessary.

Explanation of Limits and Monitoring Requirements

Intake screen wash water is active through warm weather months (normally March through November). And the de-icing water is used through cold weather months (normally November through March).

4 Schedules

4.1 Annual Certification Statement and Report for Intake Structure

Submit Annual Reports by January 31st of each year in accordance with the Annual Reports subsection in Standard Requirements.

Required Action	Due Date
Submit Annual Certification Statement and Report #1:	01/31/2026
Submit Annual Certification Statement and Report #2:	01/31/2027
Submit Annual Certification Statement and Report #3:	01/31/2028
Submit Annual Certification Statement and Report #4:	01/31/2029
Submit Annual Certification Statement and Report #5:	01/31/2030
Ongoing Annual Certification Statements and Reports: Continue to submit Annual Certification Statements and Reports until permit reissuance has been completed	

4.2 Impingement Mortality BTA Schedule

Required Action	Due Date
Plans and Specifications: These intake structure upgrades are not a reviewable project under ch. NR 108, Wis. Adm. Code. However, the permittee must submit plans and specifications for the intake screen(s) by this date showing the proposed upgrades and get department concurrence to ensure that further upgrades are not necessary to fulfill the impingement mortality BTA standard.	04/01/2027
Construction: In order to comply with the selected impingement mortality BTA standard, complete construction. This is also the date when compliance with the BTA standards must start being met.	04/01/2028

4.3 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
Report on Effluent Discharge: Submit a report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations. This analysis should also include a comparison to the applicable narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code. 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.	04/01/2026
Report on Effluent Discharge and Evaluation of Need: Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results. The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan. If the Department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for Department approval no later than 90 days after written notification was sent from the Department. The Department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued. If, however, the Department determines there is no reasonable potential for the facility to discharge PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit.	04/01/2027

4.4 Continuous pH Monitoring

Required Action	Due Date
Plans and Specification: The permittee must submit plans and specifications to the department for the continuous pH monitoring devices required for outfalls 001 and 002 in accordance with ch. NR 108, Wis. Adm. Code.	04/01/2026

Installation: The permittee must complete installation of the pH monitoring devices by this date	04/01/2027

Explanation of Schedules

Annual Certification Statement and Report 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.

Impingement Mortality BTA Schedule

The department determined that the current CWIS is not considered BTA for reducing impingement mortality. The permittee has chosen to meet the impingement mortality BTA standards through the use of a 0.5 fps maximum design intake velocity. This schedule will provide the permittee with adequate time to meet the selected 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.

Continuous pH Monitoring

A schedule for the installation of continuous pH monitoring devices at outfalls 001 and 002 has been included in order to provide the permittee with adequate time to meet the new continuous monitoring requirements.

Attachments:

Attachment #1: Water Quality Based Effluent Limits

Attachment #2: CWIS BTA Determination Northern States Power Company – Bay Front Generating Plant

Expiration Date:

Enter Date

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

Notice of [Enter one: issuance/reissuance/modification] was published in the [Enter name of publication] , [Enter address of publication] .

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: December 17, 2024

TO: Sawyer Hanson – WY/3

FROM: Michael Polkinghorn – NOR/Rhinelander Service Center

SUBJECT: Water Quality-Based Effluent Limitations for the Northern States Power Company – Bayfront Plant
WPDES Permit No. WI-0002887-09-0

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from the Northern States Power Company – Bayfront Plant in Ashland County. This industrial facility discharges to Chequamegon Bay of Lake Superior, located in the Fish Creek Watershed in the Lake Superior Basin. The evaluation of the permit recommendations is discussed in more detail in the attached report.

Based on our review, the following recommendations are made on a chemical-specific basis at the following outfalls and/or sample points:

Outfall 001

Parameter	Daily Maximum	Daily Minimum	Footnotes
Flow Rate			1
pH	9.0 s.u.	6.0 s.u.	1
Phosphorus			1
Mercury (Total Recoverable)	5.0 ng/L		2
PFOS and PFOA			3
Arsenic (Total Recoverable)			1
Additive – Tri-Act 1800			4
Additive – Eliminox			5
PCBs	0 lbs/day		6
Chlorine (Total Residual)			7
Temperature			1, 8
Acute WET			9, 11
Chronic WET			10, 11

Footnotes:

1. No changes from the current permit term.
2. Due to technical and economic considerations, the Department granted a mixing zone phase-out exception for mercury. The alternative effluent limit is based on the 1-day P_{99} of effluent data.
3. Monthly monitoring is required in accordance with s. NR 106.98(2), Wis. Adm. Code.
4. This additive is approved for use during the reissued permit term at the requested maximum dosage of 2 GPD.

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5. This additive is approved for use during the reissued permit term at the requested maximum dosage of 2 GPD and greater than or equal to 4 consecutive days/wk.
6. These limits are categorical limits based on ch. NR 290, Wis. Adm. Code. These limits are not addressed in this evaluation and may need to be adjusted based on current production.
7. Paired monthly chlorine monitoring with either Lake Superior intake is recommended during the reissued permit term to support the conditions as described in s. NR 106.06(6), Wis. Adm. Code.
8. Maximum, minimum, and average samples required.
9. Annual acute whole effluent toxicity (WET) testing is recommended during the reissued permit term. 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.
10. Annual chronic WET testing is recommended during the reissued permit term. 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 on Outfall 001 shall be a grab sample collected from Lake Superior outside of the confluence of other discharges.
11. 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).

Sample Point 101

Parameter	Daily Maximum	Footnotes
Flow Rate		1
TSS	100 mg/L	2
Oil & Grease (Hexane)	20 mg/L	2

Footnotes:

1. No changes from the current permit term.
2. These limits are categorical limits based on ch. NR 290, Wis. Adm. Code. These limits are not addressed in this evaluation and may need to be adjusted based on current production.

Sample Point 103

Parameter	Daily Maximum	Monthly Average	Footnotes
Flow Rate			1
TSS	100 mg/L	30 mg/L	2, 3
Oil & Grease (Hexane)	20 mg/L	15 mg/L	2, 3

Footnotes:

1. No changes from the current permit term.
2. These limits are categorical limits based on ch. NR 290, Wis. Adm. Code. These limits are not addressed in this evaluation and may need to be adjusted based on current production.
3. Calculated mass discharge is required for Outfall 015.

Outfall 002

Parameter	Daily Maximum	Daily Minimum	Footnotes
Flow Rate			1
pH	9.0 s.u.	6.0 s.u.	1
Chlorine (Total Residual)	38 µg/L		
Arsenic (Total Recoverable)			1
Chlorine (Total Residual)			2
Temperature			1, 3

Footnotes:

1. No changes from the current permit term.
2. Paired monthly chlorine monitoring with either Lake Superior intake is recommended during the reissued permit term to support the conditions as described in s. NR 106.06(6), Wis. Adm. Code.
3. Maximum, minimum, and average samples required.

Outfall 004

Parameter	Daily Maximum	Daily Minimum	Monthly Average	Footnotes
Flow Rate				1
TSS	100 mg/L		30 mg/L	2, 3
pH	9.0 s.u.	6.0 s.u.		1
Oil & Grease (Hexane)	20 mg/L		15 mg/L	2, 3
Phosphorus				1
Temperature				1

Footnotes:

1. No changes from the current permit term.
2. These limits are categorical limits based on ch. NR 290, Wis. Adm. Code. These limits are not addressed in this evaluation and may need to be adjusted based on current production.
3. Calculated mass discharge is required for Outfall 015.

Outfalls 007, 013, 016, 017, & 018

Parameter	Footnotes
Flow Rate	1
Chlorine (Total Residual)	2

Footnotes:

1. No changes from current permit term.

2. For Outfalls 007 and 013 only: Paired monthly chlorine monitoring with either Lake Superior intake is recommended during the reissued permit term to support the conditions as described in s. NR 106.06(6), Wis. Adm. Code.

Outfall 015

Parameter	Daily Maximum	Monthly Average	Footnotes
Flow Rate			1
TSS	1,268 lbs/day	67 lbs/day	2
Oil & Grease (Hexane)	254 lbs/day	33 lbs/day	2

Footnotes:

1. No changes from the current permit term.
2. These limits are categorical limits based on ch. NR 290, Wis. Adm. Code. These limits are not addressed in this evaluation and may need to be adjusted based on current production.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Michael Polkinghorn at (715) 360-3379 or Michael.Polkinghorn@wisconsin.gov and Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (3) – Narrative, discharge area map, & thermal tables

PREPARED BY: Michael A. Polkinghorn – Water Resources Engineer

E-cc: Eric de Venecia, Wastewater Engineer – NOR/Superior Service Center
Michelle BalkLudwig, Regional Wastewater Supervisor – NOR/Spooner Service Center
Diane Figiel, Water Resources Engineer – WY/3
Nathaniel Willis, Wastewater Engineer – WY/3

Attachment #1

Water Quality-Based Effluent Limitations for
Northern States Power Company – Bayfront Plant

WPDES Permit No. WI-0002887-09-0

Prepared by: Michael A. Polkinghorn

PART 1 – BACKGROUND INFORMATION

Facility Description

The Northern States Power Company – Bayfront Plant (NSPC – Bayfront Plant) is a 44-megawatt steam electric generating plant that burns wood chips, railroad ties, tire-derived fuel, and natural gas. The facility has stopped burning coal in 2020. The plant uses 2 boilers and 2 turbine generators connected by a common header system. Any one boiler or combination of boilers can provide steam to any one or all turbine generators. The facility uses intake water from Lake Superior to cool the turbine steam.

NSPC – Bayfront Plant has multiple discharges from the facility which all discharge to Chequamegon Bay of Lake Superior. These discharges are as follows:

- Outfall 001 consists of condenser cooling water, noncontact cooling water, well water that is used to fill the boiler and produce steam, dewatering bin, reverse osmosis unit concentrate, all floor drains, engine/water pump cooling water from the fire pump monthly operational tests, and various sump waters. Sample Point 101 monitors sampling for boiler drawdown water (Boilers 1 & 2) prior to mixing with condenser cooling water at Outfall 001. Sample Point 103 monitors sampling for collection tank wastewaters prior to mixing with other wastewaters at Outfall 001.
- Outfall 002 consists of condenser cooling water.
- Outfall 004 consists of emergency overflow from collection tank overflow and for scheduled maintenance.
- Outfalls 007 and 013 consist of noncontact service water.
- Outfall 015 is a reporting point for the combined discharge mass limits from the collection tank (Sample Point 103 and Outfall 004).
- Outfall 016 consists of lake water directed to clean debris from the traveling screen across the mouth of the inlet slip.
- Outfalls 017 and 018 consist of warm condenser water diverted prior to discharge from Outfalls 001 and 002 respectively used to de-ice the intake screens in the winter.

Attachment #2 is a discharge area map of the various outfalls.

Existing Permit Limitations

The current permit, expired on 06/30/2023, includes the following effluent limitations and monitoring requirements.

Outfall 001

Parameter	Daily Maximum	Daily Minimum	Footnotes
Flow Rate			1

Attachment #1

Parameter	Daily Maximum	Daily Minimum	Footnotes
pH	9.0 s.u.	6.0 s.u.	2
Phosphorus			1
Mercury (Total Recoverable)			1
Arsenic (Total Recoverable)			1
PCBs	0 lbs/day		3
Temperature			1, 4

Footnotes:

1. Monitoring only.
2. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, **limitations for these water quality characteristics do not need to be re-evaluated at this time.**
3. These limits are categorical limits based on ch. NR 290, Wis. Adm. Code. These limits are not addressed in this evaluation and may need to be adjusted based on current production.
4. Maximum, minimum, and average samples required.

Sample Point 101

Parameter	Daily Maximum	Footnotes
Flow Rate		1
TSS	100 mg/L	2
Oil & Grease (Hexane)	20 mg/L	2

Footnotes:

1. Monitoring only.
2. These limits are categorical limits based on ch. NR 290, Wis. Adm. Code. These limits are not addressed in this evaluation and may need to be adjusted based on current production.

Sample Point 103

Parameter	Daily Maximum	Monthly Average	Footnotes
Flow Rate			1
TSS	100 mg/L	30 mg/L	2, 3
Oil & Grease (Hexane)	20 mg/L	15 mg/L	2, 3

Footnotes:

1. Monitoring only.

2. These limits are categorical limits based on ch. NR 290, Wis. Adm. Code. These limits are not addressed in this evaluation and may need to be adjusted based on current production.
3. Calculated mass discharge is required for Outfall 015.

Outfall 002

Parameter	Daily Maximum	Daily Minimum	Footnotes
Flow Rate			1
pH	9.0 s.u.	6.0 s.u.	2
Arsenic (Total Recoverable)			1
Temperature			1, 3

Footnotes:

1. Monitoring only.
2. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, **limitations for these water quality characteristics do not need to be re-evaluated at this time.**
3. Maximum, minimum, and average samples required.

Outfall 004

Parameter	Daily Maximum	Daily Minimum	Monthly Average	Footnotes
Flow Rate				1
TSS	100 mg/L		30 mg/L	2, 3
pH	9.0 s.u.	6.0 s.u.		4
Oil & Grease (Hexane)	20 mg/L		15 mg/L	2, 3
Phosphorus				1
Temperature				1

Footnotes:

1. Monitoring only.
2. These limits are categorical limits based on ch. NR 290, Wis. Adm. Code. These limits are not addressed in this evaluation and may need to be adjusted based on current production.
3. Calculated mass discharge is required for Outfall 015.
4. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, **limitations for these water quality characteristics do not need to be re-evaluated at this time.**

Outfalls 007, 013, 016, 017, & 018

Parameter	Footnotes
Flow Rate	1

Footnotes:
1. Monitoring only.

Outfall 015

Parameter	Daily Maximum	Monthly Average	Footnotes
Flow Rate			1
TSS	1,268 lbs/day	67 lbs/day	2
Oil & Grease (Hexane)	254 lbs/day	33 lbs/day	2

Footnotes:
1. Monitoring only.
2. These limits are categorical limits based on ch. NR 290, Wis. Adm. Code. These limits are not addressed in this evaluation and may need to be adjusted based on current production.

Receiving Water Information

- Name: Chequamegon Bay of Lake Superior (Lake Superior)
- Waterbody Identification Code (WBIC): 2751220
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Cold Water (CW) community, public water supply, and outstanding resource water (ORW).
- 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. A mixing zone is not allowed for discharges of bioaccumulating compounds of concern (BCCs) in the Great Lakes system as described in s. NR 106.06(2)(br), Wis. Adm. Code.
- Hardness = 45 mg/L as $CaCO_3$. This value represents the geometric mean of WET test data (n = 6, November 2017 – February 2022) from the Ashland Sewage Utility.
- Source of background concentration data: Metals data from the Bad River and Bois Brule River are used in this evaluation. Background chlorine data from the facility's Lake Superior intake are also used. Those values are shown in the tables in Part 2 below, in the columns titled "MEAN BACK-GRD.". If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen and mercury are described later.
- Multiple dischargers: There are several other dischargers to Lake Superior; 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 Superior is on the Clean Water Act Section 303(d) list for mercury, polychlorinated biphenols (PCBs), and perfluorinated alkylated substances (PFOS) contamination in fish tissue. These pollutants do not impact the WQBELs due to the concerned concentrations being

limited to the fish tissue.

Effluent Information

- Flow rates (July 2018 – July 2024):
  - Outfall 001
    - 365-day maximum annual average: 16.6 million gallons per day (MGD)
    - Overall average: 14.1 MGD
  - Outfall 002
    - 365-day maximum annual average: 18.9 MGD
    - Overall average: 14.3 MGD
  - Outfall 004
    - Discharge did not occur during the current permit term.
  - Outfall 007
    - 365-day maximum annual average: 7,200 gallons per day (GPD)
    - Overall average: 7,200 GPD
  - Outfall 013
    - 365-day maximum annual average: 19,200 GPD
    - Overall average: 19,200 GPD
  - Outfall 015
    - Discharge did not occur during the current permit term.
  - Outfall 016
    - Peak daily: 3,000 GPD
    - Overall average: 3,000 GPD
  - Outfall 017
    - Peak daily: 1.4 MGD
    - Overall average: 1.4 MGD
  - Outfall 018
    - Peak daily: 3.0 MGD
    - Overall average: 2.4 MGD
- Hardness = 51 mg/L as $CaCO_3$. This value represents the geometric mean of data (n = 8, August 2022) from Outfalls 001 and 002 permit application required monitoring.
- 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 Superior and private well.
- Additives: The facility has included 7 additives in the permit application that will be used in the process waste streams to Outfalls 001 and 004. These additives are listed below:
  - Hawkins Chemical Hydrochloric Acid – Demineralizer agent for Demin unit.
  - Hawkins Chemical Sodium Hydroxide – Demineralizer agent for Demin unit.
  - Nalco Tri-Act 1800 – Corrosion inhibitor.
  - Nalco BT-3011 – Boiler water treatment/pH control.
  - Nalco Eliminox – Oxygen scavenger.
  - Nalco BT-0100 – Boiler water treatment/pH control.
  - Nalco Perma Treat PC-191T – Antiscalent for RO unit.
  - The need for any limits or use restrictions for these additives is evaluated in Part 6 of this evaluation.
- Effluent characterization: This facility is categorized as a secondary industry, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, primarily metal substances plus ammonia, chloride,

hardness, and phosphorus. This monitoring was required for Outfalls 001, 002, 007, and 013. The current permit required monitoring for mercury, arsenic, and temperature.

- Effluent characterization: This facility received instructions in the application notification letter that exempt it from standard monitoring requirements for Outfalls 004 and 015 – 018.
- 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.
- Mercury field blanks (Sample Point 102) indicated contamination was present from either sample transportation or environmental sources via 3 detects on the 06/06/2022, 04/18/2023, and 07/10/2023 samples. Therefore, the effluent mercury samples associated with those blanks are not used in this evaluation.

Outfall 001 Mercury Effluent Data

Statistic	Conc. (ng/L)
1-day P_{99}	5.0
4-day P_{99}	2.7
30-day P_{99}	1.4
Mean	0.86
Std	1.1
Sample size	22
Range	<0.16 - 4.9

"<" 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 001 Arsenic & Copper Effluent Data

Sample Date	Arsenic (µg/L)	Copper (µg/L)
07/02/2018	<2.10	
10/22/2018	0.47	
04/23/2019	0.69	
10/08/2019	0.56	
05/05/2020	0.62	
10/13/2020	0.40	
05/04/2021	0.58	
10/19/2021	0.64	
05/25/2022	0.62	
08/02/2022		1.2
08/12/2022		1.1
08/16/2022		1.1
08/19/2022		1
10/04/2022	<0.15	
03/01/2023	0.27	
10/03/2023	<0.50	
04/02/2024	0.57	
Mean*	0.42	1.1

"<" 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.

Outfalls 001/002/007/013 Chlorine Effluent Data

Sample Date	Outfall 001 (µg/L)	Outfall 002 (µg/L)	Outfall 007 (µg/L)	Outfall 013 (µg/L)	Lake Superior Intake (µg/L)
11/21/2024*	10	30	30	20	20
11/21/2024**	20	30	20	30	20
11/22/2024*	20	<0	<0	<0	10
11/22/2024**	20	<0	10	<0	10
11/23/2024*	10	10	10	10	10
11/23/2024**	10	10	20	10	<0
11/24/2024*	10	10	10	<0	10
11/24/2024**	10	20	10	<0	10
Mean*	12.5	12.5	12.5	7.5	11.9***
Mean**	15.0	15.0	15.0	10.0	6.7***

"<" 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.

* Samples taken using a HACH DR/890 portable monitor.

** Samples taken using a HACH Pocket Colorimeter II portable monitor.

*** Lake Superior intake mean are geomeans.

Outfall 002 Arsenic Effluent Data

Statistic	Conc. (µg/L)
1-day P_{99}	1.1
4-day P_{99}	0.86
30-day P_{99}	0.63
Mean*	0.52
Std	0.19
Sample size	13
Range	<2.1 - 0.86

"<" 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 002 Copper Effluent Data

Sample Date	Conc. (µg/L)
08/02/2022	1.1
08/05/2022	1.2
08/09/2022	1.0
08/12/2022	1.2
Mean*	1.1

"<" 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 for all outfalls and sample points during July 2018 – September 2024 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6), Wis. Adm. Code:

Parameter Averages with Limits

Outfall/Sample Point	Parameter	Average Measurement*	Average Mass Discharged
Outfall 001	pH	7.4 s.u.	
	PCBs	Not sampled	
SP 101	TSS	0.8 mg/L	
	Oil & Grease (Hexane)	0.6 mg/L	
SP 103	TSS	4.2 mg/L	
	Oil & Grease (Hexane)	1.0 mg/L	
Outfall 002	pH	7.5 s.u.	
Outfall 004	TSS	No discharge	
	pH	No discharge	
	Oil & Grease (Hexane)	No discharge	
Outfall 015	TSS		No discharge
	Oil & Grease (Hexane)		No discharge

*Any 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)

The following tables list the calculated WQBELs for this discharge along with the results of effluent sampling. All concentrations are expressed in terms of micrograms per liter (µg/L), except for hardness and chloride (mg/L) and mercury (ng/L).

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 10:1 dilution.

Outfall 001

SUBSTANCE	REF. HARD. mg/L	ATC	MAX. EFFL. LIMIT*	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Chlorine		19.0	38.1	**7.61**	**12.5 & 15.0**		20
Arsenic		340	679.6	135.9	0.42		0.69

Attachment #1

SUBSTANCE	REF. HARD. mg/L	ATC	MAX. EFFL. LIMIT*	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Cadmium	51	2.0	4.0	0.8	<0.15		<0.15
Chromium	51	1,036	2,072.4	414	<2.3		<2.3
Copper	51	8.2	16.4	3.3	1.1		1.2
Lead	51	56	111.3	22.3	<0.16		<0.16
Mercury (ng/L)**		830	830			5.0	4.9
Nickel	51	265	529.5	106	<0.92		<0.92
Zinc	51	67	133.3	26.7	17		17
Chloride (mg/L)		757	1,514.0	303	1.8		1.8

* Limits are calculated based on 2 X ATC because they are more stringent than limits based on a 10:1 dilution.
** A mixing zone is not allowed for discharges of bioaccumulating compounds of concern (BCCs) in the Great Lakes system as described in s. NR 106.06(2)(br), Wis. Adm. Code.

Outfall 002

SUBSTANCE	REF. HARD. mg/L	ATC	MAX. EFFL. LIMIT*	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P_{99}	1-day MAX. CONC.
Chlorine		19.0	38.1	**7.61**	**12.5 & 15.0**		30
Arsenic		340	679.6			1.1	0.86
Cadmium	51	2.0	4.0	0.8	<0.15		<0.15
Chromium	51	1,036	2,072.4	414	<2.3		<2.3
Copper	51	8.2	16.4	3.3	1.1		1.2
Lead	51	56	111.3	22.3	<0.16		<0.16
Nickel	51	265	529.5	106	<0.92		<0.92
Zinc	51	67	133.3	26.7	10		10
Chloride (mg/L)		757	1,514.0	303	1.6		1.6

* Limits are calculated based on 2 X ATC because they are more stringent than limits based on a 10:1 dilution.

Outfall 007

SUBSTANCE	ATC	MAX. EFFL. LIMIT*	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day MAX. CONC.
Chlorine	19.0	38.1	**7.61**	**12.5 & 15.0**	30
Chloride (mg/L)	757	1,514.0	303	1.7	1.7

* Limits are calculated based on 2 X ATC because they are more stringent than limits based on a 10:1 dilution.

Outfall 013

SUBSTANCE	ATC	MAX. EFFL. LIMIT*	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day MAX. CONC.
Chlorine	19.0	38.1	**7.61**	**7.5 & 10.0**	30
Chloride (mg/L)	757	1,514.0	303	1.7	1.7

* Limits are calculated based on 2 X ATC because they are more stringent than limits based on a 10:1 dilution.

Attachment #1

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 10:1 dilution.

Outfall 001

SUBSTANCE	REF. HARD. mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day CONSEC. MEAN	4-day P_{99}
Chlorine		7.28	6.7 & 11.9	**7.28**	**1.46**	**12.5 & 15.0**	**12.5 & 15.0**	
Arsenic		148.0		1,628	325.6	0.42		
Cadmium	45	1.32		14.52	2.9	<0.15		
Chromium	45	45.01		495	99.0	<2.3		
Copper	45	5.25		57.8	11.55	1.1		
Lead	45	13.01		143.1	28.6	<0.16		
Mercury (ng/L)**		440		440				2.7
Nickel	45	26.68		293	58.7	<0.92		
Zinc	45	60.15		662	132.3	17		
Chloride (mg/L)		395	3.8	4,307	861.4	1.8		

** A mixing zone is not allowed for discharges of bioaccumulating compounds of concern (BCCs) in the Great Lakes system as described in s. NR 106.06(2)(br), Wis. Adm. Code.

Outfall 002

SUBSTANCE	REF. HARD. mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day CONSEC. MEAN	4-day P_{99}
Chlorine		7.28	6.7 & 11.9	**7.28**	**1.46**	**12.5 & 15.0**	**12.5 & 15.0**	
Arsenic		148.0		1,628				0.86
Cadmium	45	1.32		14.52	2.9	<0.15		
Chromium	45	45.01		495	99.0	<2.3		
Copper	45	5.25		57.8	11.55	1.1		
Lead	45	13.01		143.1	28.6	<0.16		
Nickel	45	26.68		293	58.7	<0.92		
Zinc	45	60.15		662	132.3	10		
Chloride (mg/L)		395	3.8	4,307	861.4	1.6		

Outfall 007

SUBSTANCE	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day CONSEC. MEAN
Chlorine	7.28	6.7 & 11.9	**7.28**	**1.46**	**12.5 & 15.0**	**12.5 & 15.0**
Chloride (mg/L)	395	3.8	4,307	861.4	1.7	

Outfall 013

SUBSTANCE	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day CONSEC. MEAN
Chlorine	7.28	6.7 & 11.9	**7.28**	**1.46**	**7.5 & 10.0**	**7.5 & 10.0**

SUBSTANCE	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day CONSEC. MEAN
Chloride (mg/L)	395	3.8	4,307	861.4	1.7	

Monthly Average Limits based on Wildlife Criteria (WC)
RECEIVING WATER FLOW = 10:1 dilution.

Outfall 001

SUBSTANCE	WC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	30-day P_{99}
Mercury (ng/L)**	1.3		**1.3**	**1.4**

** A mixing zone is not allowed for discharges of bioaccumulating compounds of concern (BCCs) in the Great Lakes system as described in s. NR 106.06(2)(br), Wis. Adm. Code.

Monthly Average Limits based on Human Threshold Criteria (HTC)
RECEIVING WATER FLOW = 10:1 dilution.

Outfall 001

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	4.4		48	9.7	<0.15
Chromium	100		1,100	220	<2.3
Lead	10		110	22.0	<0.16
Mercury (ng/L)**	1.5		1.5		1.4
Nickel	100		1,100	220	<0.92

** A mixing zone is not allowed for discharges of bioaccumulating compounds of concern (BCCs) in the Great Lakes system as described in s. NR 106.06(2)(br), Wis. Adm. Code.

Outfall 002

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	4.4		48	9.7	<0.15
Chromium	100		1,100	220	<2.3
Lead	10		110	22.0	<0.16
Nickel	100		1,100	220	<0.92

Monthly Average Limits based on Human Cancer Criteria (HCC)
RECEIVING WATER FLOW = 10:1 dilution.

Outfall 001

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.

Arsenic	0.2		2.2	0.44	0.42

Outfall 002

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	30-day P_{99}
Arsenic	0.2		2.2	0.63

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

Conclusions and Recommendations
Based on a comparison of the effluent data and calculated effluent limitations, **effluent limitations are required for mercury.** Limits and monitoring recommendations are made in the paragraphs below:

Arsenic – Considering available effluent data from the current permit term, the mean effluent concentration for Outfall 001 (July 2018 – April 2024) is 0.42 µg/L. For Outfall 002 (October 2018 – April 2024), the 1-day, 4-day, and 30-day P_{99} concentrations are 1.1, 0.86, and 0.63 µg/L respectively. These are below the calculated arsenic WQBELs; therefore, **limits are not recommended during the reissued permit term. Monthly monitoring for 1 year is recommended to continue during the reissued permit term for Outfalls 001 and 002.** This is due to the likelihood of reasonable potential being demonstrated when the mean effluent concentration is compared against $1/5^{th}$ of the WQBEL based on HCC.

Total Residual Chlorine – Considering available effluent data from the current permit term (November 2024), the mean effluent concentration of samples ranged from 7.5 – 15.0 µg/L. These exceed the calculated chlorine WQBELs. Therefore, the daily maximum limit of 38 µg/L and the weekly average limit of 7.3 µg/L would be recommended during the reissued permit term for Outfalls 001, 002, 007, and 013. The monthly average limit of 7.3 µg/L would be required during the reissued permit term for Outfall 001 to satisfy the expression of limits requirements as described in ss. NR 106.07, and 205.065(7), Wis. Adm. Codes.

Subsection NR 106.06(6), Wis. Adm. Code allows the Department to implement alternative effluent limits based on elevated background concentrations whenever the representative background concentration for a toxic or organoleptic substance is determined to be greater than any applicable water quality criterion or secondary value for that substance.

The geometric mean of background chlorine samples taken at the facility's Lake Superior intake are 6.7 and 11.9 µg/L depending on the portable monitor used to take samples. For the purposes of this evaluation the 11.9 µg/L value is prioritized over the 6.7 µg/L value since the prior has all detectable samples whereas the latter has 1 nondetectable sample. This is significant because geometric means cannot be computed with values of 0 and Department policy is to replace any nondetectable values with 1. Due to the dataset size (n = 4) and the magnitude of the values in the dataset being either close to or significantly smaller than 1 depending on the concentration unit used, there is significant variability in the geometric average depending on the value used to approximate the nondetectable value. Because of this

concern, the 11.9 µg/L value is used. This background concentration is greater than the CTC but less than the ATC for chlorine. In addition the background concentration is above or slightly less than the mean effluent concentrations of the discharges sampled ranging 7.5 – 12.5 µg/L using the HACH DR/890 portable sampler, which is the same sampler used for the samples behind the 11.9 µg/L value. Similarly the background concentration is slightly more or less than the mean effluent concentrations of the discharges sampled ranging 10.0 – 15.0 µg/L using the HACH Pocket Colorimeter II portable sampler. This limited sampling effort identifies Lake Superior is a potential source of chlorine and suggests reasonable potential may be nonrepresentative of the facility's actual chlorine loading. Therefore, this provision of Wis. Adm. Code, is applicable in this scenario.

Currently there is no EPA approved TMDL for chlorine in which the following conditions must be met to determine a numeric limit is not necessary:

1. The permittee withdraws 100 percent of the intake water containing the substance from the same waterbody into which the discharge is made.
2. The permittee does not contribute any additional mass of the identified intake substance to its wastewater.
3. The permittee does not alter the identified intake substance chemically or physically in a manner that would cause adverse water quality impacts to occur that would not occur if the substance were left in-stream.
4. The permittee does not contribute to a statistically significant increase in the identified intake substance concentration, as determined by the Department, 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 of the substance in the intake water, unless the increased concentration does not cause or contribute to an excursion of water quality standard for that substance.
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 substance were left in the receiving waterbody.

This facility receives 100% of its water source from Lake Superior for Outfalls 002, 007, and 013. Outfall 001 receives approx. 99.9% of its water source from Lake Superior with approx. 0.1 % from their private well, which is considered to be negligible in this case. Correspondence with the facility indicates they do not use any halogen-based products in their waste streams contributing to the outfalls or in their private well. Because the facility discharges within the Great Lakes system and appears to meet the conditions stated prior, there is no reasonable potential for the current discharge to cause or contribute to exceedances above the WQC for chlorine. **Therefore, chlorine WQBELs are not recommended during the reissued permit term.**

Because this provision of Wis. Adm. Code, is used to remove a potential chlorine limit(s) from the permit, **paired monthly chlorine monitoring in Outfalls 001, 002, 007, 013, and in either Lake Superior intake are recommended during the reissued permit term to support the conditions as described in s. NR 106.06(6), Wis. Adm. Code.**

Mercury – Considering available effluent data from the current permit term (July 2018 – July 2024), the 30-day P_{99} concentration is 1.4 ng/L. This exceeded the calculated mercury WQBEL based on WC. **Therefore, the monthly average limit of 1.3 ng/L is recommended during the reissued permit term for Outfall 001.**

NSPC – Bayfront Plant has the option to an exception to the mixing zone phase out when calculating effluent limitations for mercury beyond November 15, 2010 under the exception for technical and

economic considerations to the mixing zone phase-out for BCCs at 40 CFR, Part 132, Appendix F, Procedure 3 C. 6. The Department has approved this exemption and additional permit requirements are discussed in Part 8 of this memorandum. Section NR 106.145(5), Wis. Adm. Code, specifies that an alternative limitation shall equal the 1-day P_{99} of the effluent data and shall be expressed as a daily maximum concentration. **Therefore, the alternative mercury limitation of 5.0 ng/L as a daily maximum is recommended during the reissued permit term.**

In the absence of a mercury alternative effluent limit or variance, mass limits and additional concentration limits to meet the expression of limits requirements in s. NR 106.07, Wis. Adm. Code, would also be required.

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98(2), Wis. Adm. Code. Previous monitoring produced a PFOS result of nondetectable at <0.307 ng/L and a PFOA result of 0.835 ng/L. These results are less than 1/5th of the respective criteria for each substance. **Based on the type of discharge, PFOS and PFOA monitoring is recommended at a monthly frequency during the reissued permit term for Outfall 001.**

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

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

Effluent ammonia nitrogen samples were all nondetectable at <0.10 mg/L (August 2022) at Outfalls 001, 002, 007, and 013. Based on this effluent data, there is no reasonable potential for those discharges to exceed the most stringent ammonia nitrogen limits that would be calculated. **Therefore, ammonia nitrogen limits and monitoring are not recommended during the reissued permit term.**

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 12-month rolling average limit of 1.0 mg/L, or an approved alternative concentration limit.

Because NSPC – Bayfront Plant does not currently have an existing technology-based limit, the need for this limit in the reissued permit is evaluated. The data in the table below demonstrates that the annual monthly average phosphorus loading is greater than 60 lbs/month, which is the threshold for industrial facilities in accordance with s. NR 217.04(1)(a)2, Wis. Adm. Code. This typically would recommend the need of a technology-based limit in the permit but the facility had conducted paired monitoring of their Lake Superior intakes (Phosphorus Concentration – Sample Points 702/703, Intake Flow – Sample Point 704) with Outfall 001 monitoring, so the limit may not be needed if it is shown the facility is not contributing to the phosphorus loading beyond the phosphorus present in Lake Superior. The paired

phosphorus sampling can estimate the magnitude donated by the combination of potential sources excluding Lake Superior but does not deduce any particular source.

Annual Average Mass Total Phosphorus Loading – Outfall 001

Month	Average Phosphorus Concentration (mg/L)	Total Effluent Flow (Million Gallons)	Calculated Mass (lbs/month)
June 2023	0.044	711	261
July 2023	0.032	531	142
Aug. 2023	<0.024	206	0
Sept. 2023	0.049	365	149
Oct. 2023	0.03	610	153
Nov. 2023	0.029	193	47
Dec. 2023	0.027	397	89
Jan. 2024	0.044	354	130
Feb. 2024	<0.005	298	0
March 2024	0.021	318	56
April 2024	0.0071	342	20
May 2024	0.036	189	57
		Average =	92

* 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 flow (MGD) for that month

The existing phosphorus loading in the receiving water is not taken into account when determining the need for a technology-based limit only the phosphorus loading that comes from the facility. In this case NSPC – Bayfront Plant uses Lake Superior intake water to facilitate almost all of their water needs, so the actual phosphorus loading from the facility can be approximated by taking the total monthly mass phosphorus data calculated earlier and subtracting the monthly phosphorus load from Lake Superior. Sample Point 704 measures the overall flow from the intakes but the intake water is diverted between Outfalls 001 and 002. Therefore, the flow used will be Sample Point 704 minus the effluent discharge of Outfall 002. The monthly Lake Superior phosphorus loading from June 2023 – May 2024 is shown in the table below:

Annual Average Mass Total Phosphorus Loading – Lake Superior (Sample Points 702 – 704)

Month	Average Phosphorus Concentration (mg/L)	Total Effluent Flow (Million Gallons)	Calculated Mass (lbs/month)
June 2023	0.056	585	273
July 2023	0.025	508	106
Aug. 2023	0.039	259	84
Sept. 2023	0.024	321	64
Oct. 2023	0.032	444	119
Nov. 2023	0.031	93	24
Dec. 2023	0.024	321	64
Jan. 2024	0.051	331	141
Feb. 2024	0.005	268	11
March 2024	<0.005	294	0
April 2024	0.041	247	85
May 2024	0.034	109	31
		Average =	84

* 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 flow (MGD) for that month

Subtracting the total monthly phosphorus loadings from the Lake Superior phosphorus loadings yields the net monthly phosphorus loadings of Outfall 001. This phosphorus loading from June 2023 – May 2024 is shown in the table below:

Net annual Average Mass Total Phosphorus Loading – Outfall 001

Month	Outfall 001 P Mass (lbs/month)	Lake Superior P Mass (lbs/month)	Outfall 001 Net P Mass (lbs/month)
June 2023	261	273	0
July 2023	142	106	36
Aug. 2023	0	84	0
Sept. 2023	149	64	85
Oct. 2023	153	119	34
Nov. 2023	47	24	22
Dec. 2023	89	64	25
Jan. 2024	130	141	0
Feb. 2024	0	11	0
March 2024	56	0	56
April 2024	20	85	0
May 2024	57	31	26
		Average =	22

The net mass phosphorus discharged is expected to be equal to or greater than the mass phosphorus in the intake accounting for any phosphorus the facility is adding to the discharge. Months where the discharged mass phosphorus is negative are changed to zero. This scenario can be caused by not accounting for other uses at the facility that divert intake water flow from Sample Point 704 other than Outfall 002. Other scenarios can be phosphorus sample-based; August 2023 is the only month where a paired sample was not done (samples were 7 days apart). In addition, the analytical method for the phosphorus samples during February 2024 – April 2024 had a limit of detection (LOD) of <0.005 mg/L where the rest of the samples had an LOD of <0.024 mg/L. This can cause inconsistent results within a paired sample and/or in comparison of other paired samples.

The annual monthly average phosphorus loading is less than 60 lbs/month. **Therefore, a technology-based limit is not recommended during the reissued permit term.** 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)(a), Wis. Adm. Code, specifies a total phosphorus criterion of 5 µg/L (0.005 mg/L) for the open and nearshore waters of Lake Superior. For discharges directly to the Great Lakes, s. NR 217.13(4), Wis. Adm. Code, says that the Department shall set effluent limits consistent with nearshore or whole lake models approved by the Department. At this time, there is no model available. According to

phosphorus implementation guidance, an interim limit should be set at a level that is achievable and that makes progress toward phosphorus reductions without the investment of temporary treatment or a compliance schedule to meet the interim limit. In the absence of an approved model, a WQBEL of 0.6 mg/L as a 6-month average would be recommended. This limit is indicative of the best readily available phosphorus removal technology at the time this rule was promulgated in 12/01/2010.

Effluent Data
The following table summarizes effluent total phosphorus monitoring data from July 2018 – May 2024.

Total Phosphorus Effluent Data

Statistics	Conc. (mg/L)
1-day P_{99}	0.082
4-day P_{99}	0.061
30-day P_{99}	0.037
Mean	0.027
Std	0.015
Sample size	70
Range	<0.024 - 0.085

Interim Limit
An interim limit is required per s. NR 217.17 when a compliance schedule is needed in the permit to meet the WQBEL. The interim limit should reflect a concentration that the facility is able to meet without investing in additional "temporary" treatment, but also should prevent backsliding from current conditions. The 6-month average limit of 0.6 mg/L is typically recommended as the interim limit along with requirements for optimization of phosphorus removal if a facility discharging to a Great Lake is readily able to meet the limit per Department policy. This is the case for NSPC – Bayfront Plant under its current operations; however, they are achieving it via both having a small phosphorus loading while also not possessing any phosphorus treatment. **Because of these considerations and reviewing other discharge scenarios to either Lake Superior or Lake Michigan, an interim phosphorus limit will not be recommended during the reissued permit term.**

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.

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 July 2018 – July 2024 for Outfalls 001 and 002.

The tables below summarize the maximum temperatures reported for Outfalls 001 and 002 along with the calculated limits:

Monthly Temperature Effluent Data & Limits – Outfall 001

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	78	81	102	120
FEB	74	75	NA*	120
MAR	70	74	NA*	120
APR	74	79	NA*	120
MAY	80	84	NA*	120
JUN	84	87	114	120
JUL	89	95	NA*	120
AUG	**89**	95	**83**	96
SEP	79	86	106	120
OCT	82	85	95	120
NOV	75	78	NA*	120
DEC	75	78	NA*	120

* NA denotes "not applicable" when the calculated weekly average limit is greater than or equal to 120 ºF.

Monthly Temperature Effluent Data & Limits – Outfall 002

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	78	81	102	120
FEB	74	75	NA*	120
MAR	70	74	NA*	120
APR	74	79	NA*	120
MAY	80	84	NA*	120
JUN	84	87	114	120
JUL	89	95	NA*	120
AUG	**89**	95	**83**	96
SEP	79	86	106	120
OCT	82	85	95	120
NOV	75	78	NA*	120
DEC	75	78	NA*	120

* NA denotes "not applicable" when the calculated weekly average limit is greater than or equal to 120 ºF.

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

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

Comparing the representative highest effluent temperature to the calculated effluent limits determines the reasonable potential of exceeding the effluent limits. The months in which limitations are recommended are shown in bold. Based on this analysis, a weekly average limit would be necessary for August for Outfalls 001 and 002. The complete temperature limit calculations are included as attachment #3.

The Department evaluated a thermal mixing zone study conducted by the facility for the purpose of recalculating the applicable temperature limits using procedures described in s. NR 106.55(10), Wis. Adm. Code. This mixing zone study was approved as the modelled mixing zone areas across all months were shown to be less than the maximum allowed mixing zone under s. NR 106.55(7)(b), Wis. Adm. Code, and concluded the acute and sub-lethal thermal water quality criteria of Chequamegon Bay were not exceeded by Outfalls 001 and 002. In this case the sub-lethal mixing zone area in August was modelled to be 2.05 acres, which is significantly smaller than the 71.74 acres (3,125,000 ft^2) allowed mixing zone for a Great Lakes shore discharge. **Therefore, temperature limits are not recommended during the reissued permit term. Temperature monitoring for Outfalls 001 and 002 is recommended to continue during the reissued permit term.**

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 (2022).*

- 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 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 on Outfall 001 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge. The specific receiving water location must be specified in the WPDES permit.

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

WET Checklist Summary

	Acute	Chronic
AMZ/IWC	Not applicable. **0 Points**	IWC = 9%. **0 Points**
Historical Data	No acute tests performed in the past 5 years. **5 Points**	No chronic tests performed in the past 5 years. **5 Points**
Effluent Variability	Little variability, no violations or upsets, consistent operations. **0 Points**	Same as acute. **0 Points**
Receiving Water Classification	Lake Superior/ORW. **15 Points**	Same as acute. **15 Points**
Chemical-Specific Data	Reasonable potential for chlorine limits based on ATC; multiple substances detected. No additional compounds of concern. **8 Points**	Reasonable potential for chlorine limits based on CTC and mercury limits based on WC; multiple substances detected. No additional compounds of concern. **9 Points**

	Acute	Chronic
Additives	No biocides and 7 water quality conditioners added. **7 Points**	Three additives used more than once per 4 days. **3 Points**
Discharge Category	Power plant. **5 Points**	Same as acute. **5 Points**
Wastewater Treatment	Consists of 0.3% process wastewater. Remaining make up is NCCW, boiler blowdown, and make up well water. **0 Points**	Same as acute. **0 Points**
Downstream Impacts	No impacts known. **0 Points**	Same as acute. **0 Points**
Total Checklist Points:	**40 Points**	**37 Points**
Recommended Monitoring Frequency (from Checklist):	Annual acute tests recommended.	Annual chronic tests recommended.
Limit Required?	No.	No.
TRE Recommended? (from Checklist)	No.	No.

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above **annual 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).

PART 7 – ADDITIVE REVIEW

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

Additive Parameters

Additive Name	Manufacturer	Purpose of Additive including where added	Use Frequency (days/wk)	Max Quantity Used	Equivalent Effluent Conc. (mg/L)	Potential Use Restriction
Hydrochloric Acid[1]	Hawkins Chemical	Demineralizer agent for Demin unit	1 day/month	64 GPD	NA	pH WQBELs
Sodium Hydroxide[1]	Hawkins Chemical	Demineralizer agent for Demin unit	1 day/month	NA	NA	Toxicity documented/understood

Attachment #1

Additive Name	Manufacturer	Purpose of Additive including where added	Use Frequency (days/wk)	Max Quantity Used	Equivalent Effluent Conc. (mg/L)	Potential Use Restriction
Tri-Act 1800[2]	Nalco	Corrosion inhibitor	7	2 GPD	0.12 mg/L	DM = 32 mg/L WA = 20 mg/L
BT-3011[1]	Nalco	Boiler water treatment/pH control	7	0.25 GPD/2 boilers	NA	pH WQBELs
Eliminox[2]	Nalco	Oxygen scavenger	7	2 GPD	0.12 mg/L	DM = 14 mg/L WA = 8.4 mg/L
BT-0100[1]	Nalco	Boiler water treatment/pH control	As needed during startup	5 GPD	NA	pH WQBELs
Perma Treat PC-191T[3]	Nalco	Antiscalent for RO unit	As needed	0.075 GPD	NA	Currently approved

1. An additive review is not necessary for any additives where either the toxicity is well documented and understood, can be controlled by a WQBEL, or are not believed to be present in the discharge.
2. Calculated based on toxicity data provided.
3. Approved in current permit at requested dosage and use frequency.

Tri-Act 1800 – This additive is used as a corrosion inhibitor in the process waste streams of Outfalls 001 and 004. This additive is currently approved at 0.75 GPD (0.25 GPD/boiler). Secondary acute and chronic values are determined based on available acute toxicity test data from the Department. The secondary acute value is 31.8 mg/L and is set directly as a daily maximum limit of 32 mg/L using 2 significant figures. The secondary chronic value is 1.77 mg/L based on the default secondary acute to chronic ratio of 18 and is calculated as a weekly average limit of 20 mg/L rounded to 2 significant figures using the same conservation of mass equation as with toxic substances in Part 2 of this evaluation.

NSPC – Bayfront Plant has requested the use of this additive at a maximum dosage rate of 2 GPD. Assuming none of the additive is lost to the environment from the application point to Outfall 001, an additive density of 8.3 lbs/gal, and an effluent flow of 16.6 MGD, the equivalent effluent concentration is approx. 0.12 mg/L. The effluent concentration is below the daily maximum and weekly average limits. At the requested maximum dosage rate, limits are not recommended. **Therefore, this additive is approved for use during the reissued permit term at the requested maximum dosage of 2 GPD.**

Eliminox – This additive is used as an oxygen scavenger in the process waste streams of Outfalls 001 and 004. This additive is currently approved at 2 GPD and less than 4 consecutive days/wk. Secondary acute and chronic values are determined based on available acute toxicity test data from the Department. The secondary acute value is 13.7 mg/L and is set directly as a daily maximum limit of 14 mg/L using 2 significant figures. The secondary chronic value is 0.76 mg/L based on the default secondary acute to chronic ratio of 18 and is calculated as a weekly average limit of 8.4 mg/L rounded to 2 significant figures using the same conservation of mass equation as with toxic substances in Part 2 of this evaluation.

NSPC – Bayfront Plant has requested the use of this additive at a maximum dosage rate of 2 GPD. Assuming none of the additive is lost to the environment from the application point to Outfall 001, an additive density of 8.6 lbs/gal, and an effluent flow of 16.6 MGD, the equivalent effluent concentration is approx. 0.12 mg/L. The effluent concentration is below both the daily maximum and weekly average limits. At the requested maximum dosage rate, limits are not recommended. **Therefore, this additive is approved for use during the reissued permit term at the requested maximum dosage of 2 GPD and greater than or equal to 4 consecutive days/wk.**

The Department should be notified if the facility wishes to use any new additive, any approved additive at a greater dosage rate(s) or use frequency(ies) than currently approved, or if updated toxicity information for an additive is available from the chemical manufacturer. An additional additive review evaluation will be needed in any case.

PART 8 – MIXING ZONE PHASE-OUT EXCEPTION FOR MERCURY

NSPC – Bayfront Plant has the option to an exception to the mixing zone phase out when calculating effluent limitations for mercury beyond November 15, 2010 under the exception for technical and economic considerations to the mixing zone phase-out for bioaccumulating chemicals of concern (BCC's) (see 40 CFR, Part 132, Appendix F, Procedure 3 C. 6). In consideration of the requirements contained at the above reference, the Department determines that:

- NSPC – Bayfront Plant is in compliance with and shall continue to comply with all applicable requirements of Clean Water Act sections 118, 301, 302, 303, 304, 306, 307, 401, and 402, including existing categorical effluent limits and WQBELs.

- NSPC – Bayfront Plant will accept a permit compliance schedule requiring the development and implementation of a Mercury Pollution Minimization Plan (PMP) meeting the requirements of s. 106.145(7), Wis. Adm. Code. The Department believes the finding at s. 106.145(1)(a), Wis. Adm. Code, sufficiently demonstrates that controls beyond a PMP would result in unreasonable economic effects because controls to remove mercury using wastewater treatment technology are not feasible or cost-effective for this facility.

- NSPC – Bayfront Plant discharges directly to Lake Superior.

- Background data from the City of Ashland water intake (n = 26, February 1977 – February 1979) is used where all the samples are equal to 0.2 ng/L, most likely equal to the best readily available limit of detection at that time. Therefore, the representative background mercury concentration for Lake Superior in the area of Chequamegon Bay is set equal to the level of detection of 0.2 ng/L.

- The discharger will reduce, to the maximum extent possible, its discharge of the BCC for which the mixing zone is requested. The mixing zone shall be no larger than necessary to account for the technical constraints and economic effects identified pursuant to this exception. Therefore, the mixing zone shall be set at 0.1:1 based on the 30-day P_{99} concentration of 1.4 ng/L, the criterion of 1.3 ng/L, and a background concentration of 0.2 ng/L.

- The limit shall be 5.0 ng/L with quarterly monitoring.

- The water quality criteria are met at the edge of the mixing zone.

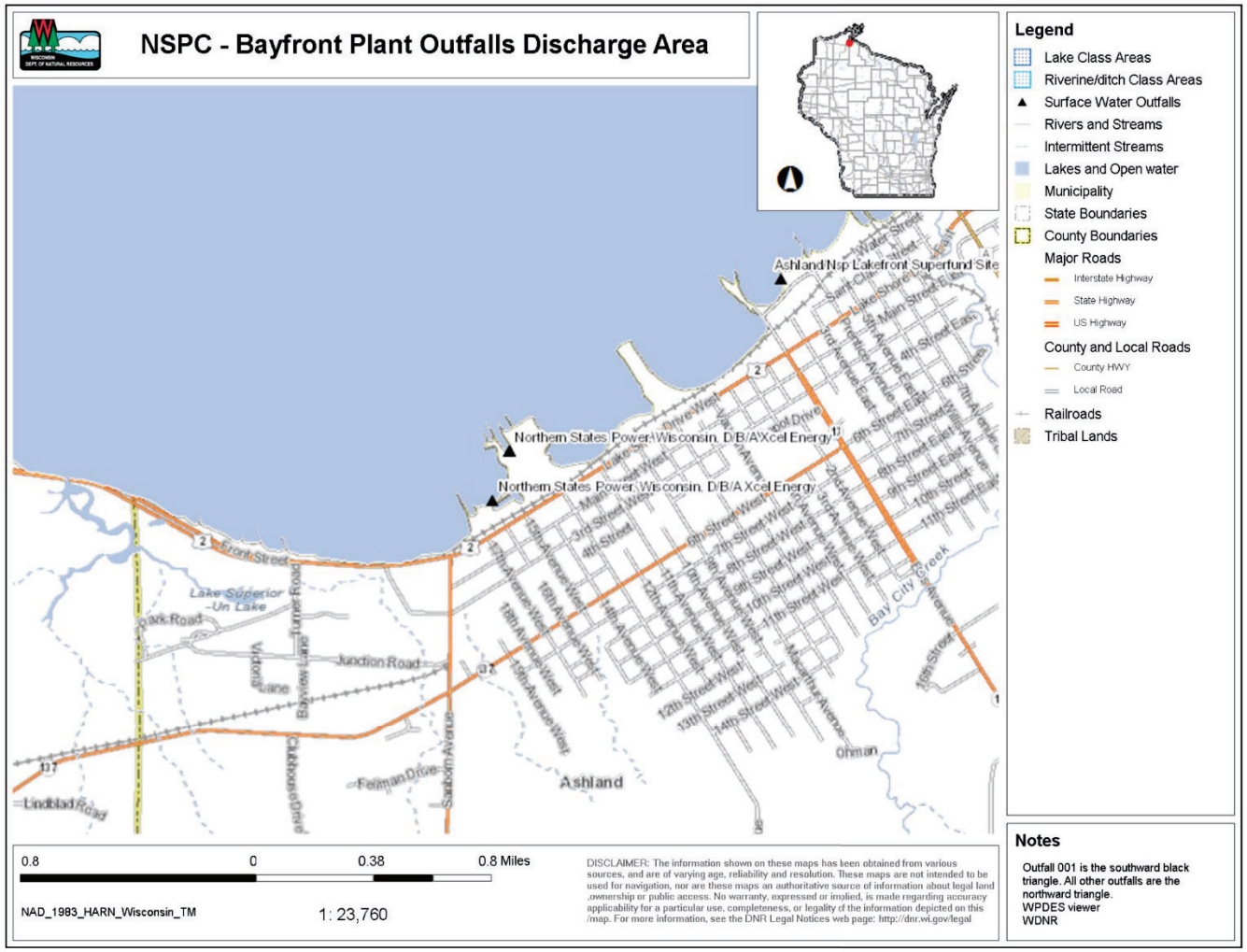
- There is currently no applicable TMDL for mercury in Lake Superior and available data indicate the concentration of mercury in Lake Superior meets all applicable water quality criteria.

- Other actions in Wisconsin to reduce releases of mercury include rules to control emissions from utility boilers and proposed mercury product legislation.

- This mixing zone and resulting WQBELs meet the requirements at 40 CFR, Part 132, Appendix F, Procedure 3 D., including that the actions will not jeopardize the continued existence of endangered or threatened species. The requirements for authorizing the exception and the circumstances under which it is being granted are essentially the same as those for granting a variance to water quality standards. The Department has analyzed the potential impacts to endangered and threatened species as part of its variance process. The analysis concluded that approval of mercury variances, with more stringent permit requirements for PMPs, is unlikely to adversely affect bald eagles or other listed species that occur within the State of Wisconsin.

Therefore, the Department grants a mixing zone extension for effluent discharges from the NSPC – Bayfront Plant due to technical and economic considerations.

The granting of this exception to the NSPC – Bayfront Plant shall apply only to the 5-year permit term of the proposed WPDES permit. The permittee will need to make a similar request and the Department will need to make a similar determination for a further continuation of a mixing zone, if those actions become appropriate for the next permit term.


NSPC - Bayfront Plant Outfalls Discharge Area
Ashland Nsp Lakefront Superfund Site
Northern States Power Wisconsin, D/B/A Xcel Energy
Northern States Power Wisconsin, D/B/A Xcel Energy
Lake Superior -Un Lake
Ashland
Legend
Lake Class Areas
Riverine/ditch Class Areas
Surface Water Outfalls
Rivers and Streams
Intermittent Streams
Lakes and Open water
Municipality
State Boundaries
County Boundaries
Major Roads
Interstate Highway
State Highway
US Highway
County and Local Roads
County HWY
Local Road
Railroads
Tribal Lands
0.8 0 0.38 0.8 Miles
NAD_1983_HARN_Wisconsin_TM
1: 23,760
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
Outfall 001 is the southward black triangle. All other outfalls are the northward triangle.
WPDES viewer
WDNR

Attachment #3

Temperature Limits for Receiving Waters without Unidirectional Flow – Outfall 001

(calculation using default ambient temperature data)

Facility: NSPC - Bayfront Plant

Outfall(s): 001

Date Prepared: 9/3/2024

Design Flow (Qe): 16.6 MGD

Lake Type: Chequamegon Bay

Discharge Type: Great Lakes shore discharge

	Temp Dates	Flow Dates
Start:	07/01/18	07/01/18
End:	07/31/24	12/23/23

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	35	41	69	17.90	21.10	0.405	0.089	0.129	78	81	102	120
FEB	35	46	69	16.99	18.41	0.405	0.078	0.096	74	75	NA	120
MAR	35	51	69	17.68	19.51	0.405	0.087	0.109	70	74	NA	120
APR	38	57	69	20.61	20.91	0.405	0.123	0.126	74	79	NA	120
MAY	50	63	72	24.04	24.54	0.405	0.166	0.172	80	84	NA	120
JUN	59	69	74	25.24	25.45	0.405	0.180	0.183	84	87	114	120
JUL	62	72	75	25.53	25.76	0.555	0.132	0.135	89	95	NA	120
AUG	64	71	76	51.77	52.21	0.555	0.369	0.372	89	95	83	96
SEP	60	66	74	25.24	25.62	0.555	0.129	0.133	79	86	106	120
OCT	49	57	72	24.59	25.56	0.405	0.172	0.184	82	85	95	120
NOV	39	48	70	18.42	20.67	0.405	0.096	0.123	75	78	NA	120
DEC	35	43	69	16.57	16.76	0.405	0.074	0.076	75	78	NA	120

Attachment #3

Temperature Limits for Receiving Waters without Unidirectional Flow – Outfall 002

(calculation using default ambient temperature data)

Facility: NSPC - Bayfront Plant

Outfall(s): 002

Date Prepared: 9/3/2024

Design Flow (Qe): 18.9 MGD

Lake Type: Chequamegon Bay

Discharge Type: Great Lakes shore discharge

	Temp Dates	Flow Dates
Start:	07/01/18	07/01/18
End:	07/31/24	04/09/24

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	35	41	69	17.90	21.10	0.405	0.089	0.129	78	81	102	120
FEB	35	46	69	16.99	18.41	0.405	0.078	0.096	74	75	NA	120
MAR	35	51	69	17.68	19.51	0.405	0.087	0.109	70	74	NA	120
APR	38	57	69	20.61	20.91	0.405	0.123	0.126	74	79	NA	120
MAY	50	63	72	24.04	24.54	0.405	0.166	0.172	80	84	NA	120
JUN	59	69	74	25.24	25.45	0.405	0.180	0.183	84	87	114	120
JUL	62	72	75	25.53	25.76	0.555	0.132	0.135	89	95	NA	120
AUG	64	71	76	51.77	52.21	0.555	0.369	0.372	89	95	83	96
SEP	60	66	74	25.24	25.62	0.555	0.129	0.133	79	86	106	120
OCT	49	57	72	24.59	25.56	0.405	0.172	0.184	82	85	95	120
NOV	39	48	70	18.42	20.67	0.405	0.096	0.123	75	78	NA	120
DEC	35	43	69	16.57	16.76	0.405	0.074	0.076	75	78	NA	120

Wisconsin Department of Natural Resources

Cooling Water Intake Structure Best Technology Available Determination

Northern States Power Company – Bay Front Generating Plant

S. Hanson – Wastewater Engineer
[Date]

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 Northern States Power Company (NSP) Bay Front Generating Plant (BFGP) 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. BFGP 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 existing CWIS is not the BTA for achieving the maximum reduction in impingement mortality.

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 BFGP does not 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

BFGP is located at 122 North 14th Avenue West, Ashland, WI, which is about 0.85 miles northeast of Prentice Park and 0.6 miles northwest of Martinsen and Bebeau Fields. The BFGP is a steam turbine generating plant consisting of two generating units with a generating capacity 44-megawatts (MW). BFGP produces electricity from burning a variety of fuels including waste wood, railroad ties, discarded tires, and natural gas. The plant uses once-through cooling with Lake Superiors' Chequamegon Bay as the source and receiver of cooling system circulating water. The design intake flow (DIF) is 68.5 million gallons per day (MGD) and the actual intake flow (AIF) is 30.47 MGD.

Intake Velocity Calculation

For the design and configuration of the CWIS (68.5 MGD DIF), the calculated design intake velocity (v) is:

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

$$v = (68.5) \times (1{,}000{,}000) \times \left(\frac{1}{24}\right) \times \left(\frac{1}{60}\right) \times \left(\frac{1}{60}\right) \times (0.1337) \times \left(\frac{1}{44.1 \times 2}\right)$$

$$v = 1.2\ {}^{ft}/_{sec}$$

Where:

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

$smallest\ total\ open\ area\ of\ intake$ = 10 ft × 9 ft × 0.49

$smallest\ total\ open\ area\ of\ intake$ = 44.1 ft^2

Open area based on 3/8 inch square mesh traveling screens with the lake level at 599 ft

For the design and configuration of the CWIS and three pump operation (30.47 MGD AIF), the calculated actual intake velocity (v) is:

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

$$v = (30.47) \times (1{,}000{,}000) \times \left(\frac{1}{24}\right) \times \left(\frac{1}{60}\right) \times \left(\frac{1}{60}\right) \times (0.1337) \times \left(\frac{1}{44.1 \times 2}\right)$$

$$v = 0.53\ {}^{ft}/_{sec}$$

Where:

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

$smallest\ total\ open\ area\ of\ intake$ = 10 ft × 9 ft × 0.49

$smallest\ total\ open\ area\ of\ intake$ = 44.1 ft^2

Open area based on 3/8 inch square mesh traveling screens with the lake level at 599 ft

Intake Structure Description

The CWIS used by BFGP withdraws water from Lake Superior. The CWIS was constructed in 2003 and consists of trash racks, three intake bays, two vertical traveling screens, a large common plenum, and three small pumphouses, each with two circulating water pumps. The intake bays are approximately 11-feet and 3-inches wide. Each intake bay has a trash rack and a traveling screen. The trash racks are made of 3/4 inch by 4 inch steel bars spaced 4 inches apart. The traveling screens are made of 3/8 inch square mesh and are 10 feet wide and 18 feet high. Only two of the three intake bays are currently used. Fish and debris that are caught on the traveling screens are removed and discharged to a trough upstream of the intake. The DIF is 68.5 MGD and the design intake velocity is 1.2 feet per second (fps). The AIF is 30.47 MGD and the actual intake velocity is 0.53 fps.

Intake Structure Face Location: 46°35'18"N, 90°54'10"W

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

As part of the WPDES Permit Application, BFGP was required to submit information required under s. NR 111.41(1) through (7) and (13). BFGP provided the information required under s. NR 111.41(1) through (7) and (13). Most of the relevant application materials were included in a report titled "Section 316(b) 40 CFR 122.21(r) Information for the Bay Front Generating Plant", dated 7/8/2017 and produced by Burns & McDonnell.

In accordance with s. NR 111.11(1)(a), BFGP 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.

Biological Data

In accordance with s. NR 111.41(3), BFGP must submit any existing biological data that is relevant to the facilities CWIS. As part of the submitted application materials BFGP included multiple studies that are summarized below. The first three studies summarized below provide baseline biological data.

Xcel completed electrofishing surveys in 2006 and 2007. A total of 967 fish from 27 species were collected during these surveys. The five most abundant species caught during these surveys were yellow perch (24.8%), rock bass (15.2%), pumpkinseed (13.7%), smallmouth bass (13.2%), and white sucker (6.8%).

Bottom trawling surveys were conducted each year between 1996 and 1999. A total of 5,908 fish were collected from 23 species. About 89% of the collected fish represented only six species. These species were yellow perch (42.6%), trout perch (18.4%), spottail shiner (13.8%), ruffe (5.7%), mimic shiner (4.9%), and white sucker (4.0%). The data from these surveys show an increase in the fish caught per hour each year.

From 1988 to 2007 the department conducted surveys of lake sturgeon using 8- to 14-inch mesh gill nets. Over these surveys a total of 945 lake sturgeon were collected. The data collected in these surveys appears to show the population lake sturgeon increasing over time.

BFGP has also completed three impingement studies. These studies occurred from April 1975 to March 1976, October 2005 to November 2006, and September 2015 to November 2016. The 1975-1976 study was likely ineffective in sampling impinged fish from fixed screens, so data from this study has not been included in further analysis of the impingement at BFGP. A total of 265 fish were collected in the 2005-2006 study and 67 fish were collected in the 2015-2016 study. The fish collected in the 2005-2006 and 2015-2016 studies represented 19 species. The most commonly impinged species were yellow perch (28.5%), pumpkinseed (18.9%), bluegill (17.0%), and smallmouth bass (10.8%).

Two entrainment studies have also been completed by BFGP. The two studies occurred from April 1996 to March 1997 and April to December 2006. Over these studies a total of 369 fish eggs and larvae were collected. Of the 369 individuals collected only 6 eggs were collected none of which were able be identified. 68.1% of the entrained larvae collected in the 1996-1997 study were rainbow smelt, however in the 2006 study rainbow smelt only accounted for 18.8% of the entrained larvae. Emerald shiners represented 47.0% of the entrained larvae collected in the 2006 study, however none were collected in the earlier study. Over the 2006 study period it was estimated that a total of 844,397 larvae and 11,785 eggs were entrained.

BFGP has also completed a desktop analysis of the susceptibility of the eggs and larvae of the fish species commonly found near BFGP's intake. The species analyzed were black bullhead, bluegill, emerald shiner, rainbow smelt, pumpkinseed, rock bass, smallmouth bass, and yellow perch. The susceptibility to entrainment of black bullhead, bluegill, pumpkinseed, rock bass, and yellow perch was deemed to be low. For smallmouth bass the susceptibility to entrainment was deemed to be moderate and it was deemed to be high for emerald shiner and rainbow smelt.

BTA Standards for Impingement Mortality

In accordance with s. NR 111.12(1)(a), BFGP 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. This standard is not currently met, so a schedule has been included in this permit.

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

BFGP currently does not employ any technologies to minimize entrainment.

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.

BFGP analyzed two options for the use of cooling towers. The first option is to install a cooling tower to serve only the Turbine #6 condenser. This option could reduce entrainment by 40%. The second option is to install cooling towers to serve all three turbines. The second option is estimated to reduce entrainment by 96 to 98.5%.

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 use of a CCRS would lead to an increase in PM_{10} emissions as well as bacterial or pathogenic emissions. This new source of PM_{10} emissions would require air permits, which may be difficult due to the area surrounding BFGP already being close to violating the PM_{10} National Ambient Air Quality Standards.

The use of one or more cooling towers would create an energy penalty. This energy penalty may need to be compensated for through the burning of additional fossil fuels, which would increase the emission of carbon dioxide, mercury, sulfur dioxide, and nitrogen oxides.

During the construction of the cooling tower(s) energy would be lost due to BFGP needing to be shut down during certain stages of the construction. This lost energy would need to be replaced by other nearby facilities, which lead to those facilities increasing their emission of carbon dioxide, mercury, sulfur dioxide, and nitrogen oxides.

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 an adequate amount of land available at BFGP for the installation of a CCRS.

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 BFGP.

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. The area surrounding BFGP includes residential and commercial areas in addition to several parks, which are all areas that would be sensitive to the increase in fogging, icing, and noise.

BFGP estimated that the quantified social benefits from eliminating the entrainment and impingement of fish to be between $638 and $3,502.

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

Cooling tower(s) would reduce the thermal discharge from BFGP. BFGP however does not currently have reasonable potential to exceed the water quality temperature criteria and thus the department does not consider this a significant factor in the BTA determination for BFGP's 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 construction of the CCRS as well as during its operation due to the parasitic load it would create as well as the reduction in turbine efficiency. This lost energy however would likely not compromise grid reliability.

1.8. Summary/Conclusion.

The use of a CCRS would reduce entrainment by reducing the necessary intake flow since water would be recirculated through the facility multiple times. However due to multiple factors including, the significant anticipated difference of the social costs and benefits that the installation and use of a CCRS would provide and the loss of energy due to the parasitic load, the department has determined that a CCRS is not BTA for reducing entrainment.

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. EPA estimated that 0-52% of organisms, that were previously entrained but would become impinged with the addition of fine mesh screens, would survive.

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 are no anticipated changes to emissions as a result of the installation and use of fine mesh screens.

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.

Since the fine mesh screens would replace the existing screens land availability is not anticipated to be a concern.

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

There are not currently any plans to retire BFGP.

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 social benefits that would result from the use of fine mesh screens is anticipated to be low due to fish eggs and larvae that were previously entrained becoming impinged instead and likely dying while on the screens.

The largest social cost associated with installing and operating a fine mesh screen is the capital cost, which would increase the electricity rates of consumers.

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

No changes would occur to the thermal discharge due to the use of fine mesh screens.

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

The installation of fine mesh screens could occur during scheduled maintenance periods, which would ensure that there would be no impacts to the reliability of energy delivery.

2.8. Summary/Conclusion.

Fine mesh screens may reduce entrainment by physically excluding eggs and larvae from passing through the CWIS, however eggs and larvae that are excluded by the screens would likely become impinged on the screens and die while impinged. Due to the low anticipated social benefits from the use of fine mesh screens the department has concluded that fine mesh screens are not BTA for minimizing entrainment.

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 to only the amount needed at all times. In cooler months when the ambient temperature of the water is lower, opportunities for flow reduction are 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.

There are no anticipated changes to emissions as a result of the installation and 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.

VSPs would replace the current pumps, so land availability is not a concern for the installation of VSPs.

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

There are not currently any plans to retire BFGP.

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

The social benefits and costs were not required to be analyzed by BFGP due to the facility withdrawing cooling water at less than 125 MGD. However, both the social costs and benefits resulting from the installation and use of one or more VSPs are anticipated to be low.

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

VSPs could likely be installed when pumps are down for maintenance or when they are otherwise not in use and thus no impacts to the reliability of energy delivery are anticipated.

3.10. Summary/Conclusion.

While the reduction in entrainment is not likely to be large relative to some of the other technologies being evaluated the department has concluded that the installation and operation of one or more VSPs is the 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.

Using another permittee's effluent or groundwater may introduce higher concentrations of certain pollutants into BFGP's waste stream. Internal water reuse is unlikely to lead to any changes in the emission of particulates or other pollutants.

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

In order to use another permittee's effluent a pipeline would need to be constructed between facilities. The length of the pipeline as well as the usage of the land it would need to be constructed through would vary depending on which facility was selected. Within a five-mile radius of BFGP the only potential source of another permittee's effluent is the Ashland Sewage Utility/Ashland Wastewater Treatment

Plant. The Ashland Wastewater Treatment Plant is located 2.5 miles southeast of BFGP and has a design flow of 1.6 MGD. The effluent from the wastewater treatment plant would require additional treatment to be installed. In addition the pipeline that would be required would have to go through an residential and commercial areas.

In the application materials the permittee stated, “Groundwater in the vicinity of the BFGP has reportedly contained contaminants resulting from manufactured gas plant activities at the site,” however no data was included to support this statement. The statement from the permittee may be in reference to the Ashland/NSP Lakefront superfund site, however this site is located approximately 0.8 miles northeast of BFGP. The use of groundwater was not analyzed further in the application materials, so the land requirement is unknown.

Internal water reuse is unlikely to require any additional land.

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

There are not currently any plans to retire BFGP.

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

The social benefits and costs were not required to be analyzed by BFGP due to the facility withdrawing cooling water at less than 125 MGD. However, it can be assumed that the social cost of using another permittee’s effluent or using groundwater would be significantly greater than the social benefits that their use would provide. Internal water reuse would provide even fewer social benefits due to there being few if any opportunities to reuse water from other processes at this facility.

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

During the process of retrofitting BFGP for water reuse or to utilize an alternative source of cooling water energy may be lost, however once the installation of the necessary equipment is completed no change to the reliability of energy delivery is anticipated.

4.7. Summary/Conclusion.

While reusing water or using an alternative source of cooling water would reduce entrainment due to reducing the amount of water withdrawn from Lake Superior the department has concluded that using an alternative source of cooling water does not represent BTA for minimizing entrainment. The department has rejected this as BTA due to the land required not being available, the potential for the emission of additional pollutants, and the significant anticipated difference between the social costs and benefits. The department has also determined that that water reuse is not BTA due to there being few to no opportunities to reuse water from other processes at the facility.

Entrainment BTA Decision

Since no technologies are currently employed by BFGP to reduce entrainment all technologies listed under s. NR 111.41(13) were considered as part of the BTA determination for BFGP. From these evaluations it was determined that the installation and operation of one or more VSPs is considered the best technology available for BFGP 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.

The use of fine mesh screens was rejected as BTA primarily due to the reduction in entrainment likely corresponding to a similar increase in impingement mortality and thus having little to no positive impact on the environment.

The use of an alternative source of cooling water was rejected as BTA due to the significant difference in anticipated social costs and benefits, the potential increase in the emissions of pollutants, and the lack of available land.

Water reuse was also rejected as BTA due to there being few if any possibilities to reuse water for cooling at the facility.

Summary

1. The permittee proposes to comply with a BTA impingement standard in s. NR 111.12, Wis. Adm. Code, through the use of a 0.5 feet per second maximum design intake velocity.
2. The department has concluded that the current CWIS does not meet the chosen BTA for impingement mortality.
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 is 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.