

# Public Noticed Vesper Draft Permit Fact Sheet

## General Information

Permit Number:	WI-0030309-10-0	
Permittee Name:	Village of Vesper	
Address:	PO Box 127	
City/State/Zip:	Vesper WI 54489-9735	
Discharge Location:	Vesper Wastewater Treatment Facility, 6363 Hemlock St, Vesper, WI 54489 East bank of Hemlock Cree about ¾ of a mile downstream from HWY 186 bridge.	
Receiving Water:	Hemlock Creek of the Hemlock Creek Watershed of the Upper Wisconsin River Southern Sub-basin located in Wood County	
StreamFlow (Q <sub>7,10</sub> ):	0.008 cfs	
Stream Classification:	Limited Forage Fish Community, Non-public Water Supply	
Discharge Type:	Existing, Continuous	
Design Flow(s)	Daily Maximum	0.303 MGD
	Monthly Maximum	0.161 MGD
	Annual Average	0.103 MGD
Significant Industrial Loading?	Yes, Kerry Ingredients	
Operator at Proper Grade?	Yes. However, after chemical feed installation to comply with phosphorus limits, an updated operator certification will be required and is part of a phosphorus compliance schedule.	
Approved Pretreatment Program?	N/A	

## Facility Description

The treatment facility is an aerated lagoon system with two ponds that treats domestic wastewater from the Village of Vesper and pretreated effluent from Kerry Ingredients (a cheese and non-dairy creamer producer). Both the primary and secondary ponds are aerated and have baffles across them to enhance treatment and prevent short circuiting. Rotating biological contactor (RBC) units are between the two ponds to provide ammonia removal. Chemical addition is used for phosphorus removal. Effluent is treated seasonally with UV disinfection before discharge to Hemlock Creek. The annual average design flow of the system is 0.103 million gallons per day (MGD) and had an actual annual average of 0.100 MGD in 2022. The permittee resubmitted a dissipative cooling (DC) request to the department. After review, the department determined that a free zone of passage exists in the receiving stream and thereby reapproved the DC request. Therefore, no effluent temperature limits are included this permit term, however one year of effluent temperature monitoring will be required. Significant effluent monitoring and/or limit changes proposed for this issuance are as follows: 1) the conditional approval of a multi-discharger variance (MDV) for phosphorus and the imposition of a lower monthly average interim phosphorus limit along with associated compliance schedules to comply with s. 283.16, Wis. Stats. requirements for phosphorus, 2) the addition of annual effluent monitoring for total nitrogen, nitrite + nitrate nitrogen and TKN, 3) seasonal fecal coliform limits have been replaced with E. coli limits, 4) chloride monitoring, 5) a new chronic WET monthly average limit, 6) addition of monitoring for effluent PFOS and PFOA once every two months and an associated determination of need schedule in accordance with s. NR 106.98(2)(b), Wis. Adm. Code., and 6) PFAS

sludge sampling has been included in the proposed WPDES permit pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9., Wis. Adm. Code to quantitate risk. Clarification language has been added in the Land Application section notifying the permittee they must monitor sludge for List 2 nutrients and meet the requirements of List 3 (Pathogen Control) and List 4 (Vector Attraction Reduction) prior to landspreading if they remove sludge from the lagoon(s).

## Substantial Compliance Determination

**Enforcement During Last Permit:** None.

After a desk top review of all discharge monitoring reports, CMARs, compliance schedule items by Logan Rubeck and a site visit on 03/09/2023 by Peter Pfefferkorn, the Vesper Wastewater Treatment Facility has been found to be in substantial compliance with their current permit.

Compliance determination entered by Logan Rubeck on January 4, 2024.

Sample Point Designation		
Sample Point Number	Discharge Flow, Units, and Averaging Period	Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)
701	0.100 MGD 2023	Representative influent samples shall be collected after the wet well prior to the first treatment unit.
003	0.107 MGD 2023	Representative effluent samples shall be collected prior to discharge to Hemlock Creek.
002	Lagoon sludge- no plan for removal	Representative composite sludge samples shall be collected from the aerated lagoon and monitored for List 1, PCBs, and PFAS once during 2025.

## 1 Influent – Monitoring Requirements

### Sample Point Number: 701- PRIOR TO FIRST TREATMENT

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	2/Week	24-Hr Flow Prop Comp	

### Changes from Previous Permit:

Flow sample frequency was changed from continuous to daily for eDMR reporting purposes.

### Explanation of Limits and Monitoring Requirements

Monitoring of influent flow, BOD5 and total suspended solids is required by s. NR 210.04(2), Wis. Adm. Code, to assess wastewater strengths and volumes and to demonstrate the percent removal requirements in s. NR 210.05, Wis. Adm. Code, and in the Standard Requirements section of the permit. Influent monitoring requirements are in accordance with NR 206.09(2), Wis. Adm. Code.

## 2 Surface Water - Monitoring and Limitations

## Sample Point Number: 003- PRIOR TO HEMLOCK CREEK

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Flow Rate		MGD	Daily	Continuous	
BOD5, Total	Daily Max	30 mg/L	2/Week	24-Hr Flow Prop Comp	
BOD5, Total	Monthly Avg	15 mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Daily Max	30 mg/L	2/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	20 mg/L	2/Week	24-Hr Flow Prop Comp	
pH Field	Daily Max	9.0 su	5/Week	Grab	
pH Field	Daily Min	6.0 su	5/Week	Grab	
Dissolved Oxygen	Daily Min	4.0 mg/L	5/Week	Grab	
Nitrogen, Ammonia (NH3-N) Total	Daily Max-Variable	0 mg/L	Weekly	24-Hr Flow Prop Comp	See ammonia footnote for limits.
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	5.3 mg/L	Weekly	24-Hr Flow Prop Comp	See ammonia footnote.
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	5.3 mg/L	Weekly	24-Hr Flow Prop Comp	See ammonia footnote.
Phosphorus, Total	Monthly Avg	0.6 mg/L	2/Week	24-Hr Flow Prop Comp	This is an interim MDV limit effective on Jan 1, 2027. See the MDV/Phosphorus subsections and phosphorus schedules.
Phosphorus, Total	Monthly Avg	1.0 mg/L	2/Week	24-Hr Flow Prop Comp	This is an interim MDV limit effective through Dec 31, 2026. See the MDV/Phosphorus subsections and phosphorus schedules.
Phosphorus, Total		lbs/month	Monthly	Calculated	Report the total monthly phosphorus discharged in lbs/month on the last day of the month on the DMR. See Standard Requirements for 'Appropriate Formulas' to calculate the Total Monthly Discharge in lbs/month
Phosphorus, Total		lbs/yr	Annual	Calculated	Report the sum of the total monthly discharges (for the months that the MDV is in effect) for the calendar year on the Annual report form.

<b>Monitoring Requirements and Limitations</b>					
<b>Parameter</b>	<b>Limit Type</b>	<b>Limit and Units</b>	<b>Sample Frequency</b>	<b>Sample Type</b>	<b>Notes</b>
Copper, Total Recoverable		ug/L	Quarterly	24-Hr Flow Prop Comp	Sample concurrently with WET tests.
Chloride		mg/L	Quarterly	24-Hr Flow Prop Comp	Sample concurrently with WET tests.
Temperature Maximum		deg F	3/Week	Multiple Grab	Monitoring in 2028 only. See Temperature footnote.
PFOS		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
PFOA		ng/L	1/ 2 Months	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen. Annual in rotating quarters. See Nitrogen Series Monitoring section.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET footnote.
Chronic WET	Monthly Avg	1.0 TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET footnote.
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit and monitoring apply May-Sept annually. See E. coli section.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit and monitoring apply May-Sept annually. See E. coli section.

## Changes from Previous Permit

Changes include: 1) the conditional approval of a multi-discharger variance (MDV) for phosphorus and the imposition of a lower monthly average interim phosphorus limit along with associated compliance schedules to comply with s. 283.16, Wis. Stats. requirements for phosphorus, 2) the addition of annual effluent monitoring for total nitrogen, nitrite + nitrate nitrogen and TKN, 3) seasonal fecal coliform limits have been replaced with E. coli limits, 4) chloride monitoring, 5) new



chronic WET monthly average limit, 6) addition of monitoring for effluent PFOS and PFOA once every two months and an associated determination of need schedule in accordance with s. NR 106.98(2)(b), Wis. Adm. Code.,

**E. coli-** Fecal coliform monitoring and limits have been replaced with Escherichia coli (E. coli) monitoring and limits. See additional explanation of limits under “Explanation of Limits and Monitoring Requirements” below.

**Total Nitrogen Monitoring (TKN, N02+N03 and Total N)-** Annual monitoring in rotating quarters throughout the permit term was added to the permit.

**Phosphorus MDV -** The permittee has applied for a multi-discharger variance (MDV) for phosphorus for this permit term and the application has been approved by the Department. An MDV interim limit of 0.6 mg/L has been added that goes into effect per a compliance schedule. The permittee is now required to report the total amount of phosphorus discharged in lbs/month and lbs/year. By March 1 of each year the permittee shall make a payment(s) to participating county(s) of \$64.75 per pound of phosphorus discharged during the previous year in excess of the target value of 0.2 mg/L.

## Explanation of Limits and Monitoring Requirements

**MUNICIPAL EFFLUENT LIMITS** – In accordance with the federal regulation 40 CFR 122.45(d), and to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, limits in this permit are to be expressed as weekly average and monthly average limits whenever practicable.

The effluent monitoring frequency for all parameters were considered. Monitoring frequencies are based on the size and type of the facility and are established to best characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Requirements in administrative code (NR 108, 205, 210 and 214 Wis. Adm. Code) and Section 283.55, Wis. Stats. were considered, where applicable, when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. For more information see the March 22, 2021 version of the Bureau of Water Quality Program Guidance Document “Monitoring Frequencies for Individual Wastewater Permits”. The department has determined at this time that pH and dissolved oxygen monitoring frequency increase to 5/Week to better align with the standard for similar facilities with limits. Flow frequency was also changed from continuous to daily for eDMR reporting purposes.

Limits were determined for this existing discharge using chs. NR 102, 105, 106, 205, 210 and 217 of the Wisconsin Administrative Code (where applicable). For additional information on any of the limits see the December 21, 2023 memo from Ben Hartenbower to Angela Parkhurst titled “Water Quality-Based Effluent Limitations for the Vesper Wastewater Treatment Facility WPDES Permit No. WI-0030309”.

**BOD, TSS and pH:** Monitoring and limits for BOD, TSS and pH correspond to the requirements in the current permit since the facility has not increased the capacity of the wastewater treatment system since the last permit issuance, nor are increases expected during the term of the proposed permit.

**Ammonia-** Current acute and chronic ammonia toxicity criteria for the protection of aquatic life are included in Tables 2C and 4B of ch. NR 105, Wis. Adm. Code. Subchapter IV of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for ammonia. The permit requires 5.3 mg/L weekly and monthly averages, in addition to variable daily maximum limits based on pH. Daily maximum ammonia limits that vary with effluent pH apply year-round. See table below titled “Variable Daily Maximum Ammonia Limits” for more information. Samples for ammonia shall be collected at the same time as the pH samples.

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
6.0 ≤ pH ≤ 6.1	56	7.0 < pH ≤ 7.1	34	8.0 < pH ≤ 8.1	7.2
6.1 < pH ≤ 6.2	55	7.1 < pH ≤ 7.2	31	8.1 < pH ≤ 8.2	6.0

6.2 < pH ≤ 6.3	54	7.2 < pH ≤ 7.3	27	8.2 < pH ≤ 8.3	4.9
6.3 < pH ≤ 6.4	53	7.3 < pH ≤ 7.4	24	8.3 < pH ≤ 8.4	4.0
6.4 < pH ≤ 6.5	51	7.4 < pH ≤ 7.5	21	8.4 < pH ≤ 8.5	3.3
6.5 < pH ≤ 6.6	49	7.5 < pH ≤ 7.6	18	8.5 < pH ≤ 8.6	2.8
6.6 < pH ≤ 6.7	46	7.6 < pH ≤ 7.7	15	8.6 < pH ≤ 8.7	2.3
6.7 < pH ≤ 6.8	44	7.7 < pH ≤ 7.8	13	8.7 < pH ≤ 8.8	1.9
6.8 < pH ≤ 6.9	41	7.8 < pH ≤ 7.9	11	8.8 < pH ≤ 8.9	1.6
6.9 < pH ≤ 7.0	38	7.9 < pH ≤ 8.0	8.7	8.9 < pH ≤ 9.0	1.4

**Copper:** Using effluent data from the current permit term, the effluent concentrations are below the calculated WQBELs for copper and therefore no effluent limits are needed. To ensure that representative sample results are available at the next permit issuance, quarterly monitoring is required.

**Chloride-** Acute and chronic chloride toxicity criteria for the protection of aquatic life are included in Tables 1 and 5 of ch. NR 105, Wis. Adm. Code. Subchapter VII of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for chloride. To ensure that representative sample results are available at the next permit issuance, quarterly monitoring is required.

**Mercury-** Requirements for mercury are included in s. NR 106.145 Wis. Adm. Code. No limits or monitoring is required.

**Disinfection/E. Coli/Fecal Coliform:** Fecal coliform monitoring and limits have been replaced with *Escherichia coli* (*E. coli*) monitoring and limits. Revisions to bacteria surface water quality criteria to protect recreational uses and accompanying *E. coli* WPDES permit implementation procedures became effective May 1, 2020. The new rule requires that WPDES permits for facilities with required disinfection include monitoring for *E. coli* while facilities are disinfecting during the recreation period and establish effluent limitations for *E. coli* established in s. NR 210.06 (2), Wis. Adm Code. The administrative code rule changes included the following actions: revised the bacteria water quality criteria from fecal coliform to *E. coli* to protect recreation in ch. NR 102, Wis. Adm. Code.; removed fecal coliform criteria for certain individual waters from ch. NR 104, Wis. Adm. Code.; revised permit requirements for publicly and privately owned sewage treatment works in ch. NR 210, Wis. Adm. Code.; and, updated approved analytical methods for bacteria in ch. NR 219, Wis. Adm. Code.

**Thermal-** Requirements for Temperature are included in NR 102 Subchapter II Water Quality Standards for Temperature and NR 106 Subchapter V Effluent Limitations for Temperature. Thermal discharges must meet the Public Health criterion of 120 degrees F and the Fish & Aquatic Life criteria which are established to protect aquatic communities from lethal and sub-lethal thermal effects. The permittee re-submitted a dissipative cooling (DC) request to the department. After review, the department re- approved the DC request. Therefore, no effluent temperature limits are included this permit term, however one year of effluent temperature monitoring will be required.

**Phosphorus** - Phosphorus rules became effective December 1, 2010 per NR 217, Wis. Adm. Code, that required the permittee to comply with water quality based effluent limits (WQBELs) for total phosphorous. Vesper is included within the Wisconsin River Basin TMDL, which was approved by EPA April 26, 2019. The TMDL establishes Waste Load Allocations (WLAs) for point source dischargers and determines the maximum amounts of phosphorus that can be discharged and still protect water quality. The final effluent limits and monitoring are 0.60 lbs/day monthly average and 0.20 lbs/day 6-month average and were to become effective as scheduled unless a variance was granted. For this permit term, the permittee has applied for the Multi-Discharger Variance (MDV) for phosphorus as provided for in s. 283.16, Wis. Stats., and approved by USEPA on February 6, 2017 for a 10-year duration. The permittee qualifies for the MDV because it is an existing source and a major facility upgrade is needed to comply with the applicable phosphorus WQBELs, thereby creating a financial burden. Under the phosphorus MDV, a level currently achievable (LCA) interim

limit of 1.0 mg/L is effective upon permit reissuance. A compliance schedule is included in the permit to obtain the highest attainable condition (HAC) limit of 0.6 mg/L. Data used for these calculations were from October 2018 to October 2023.

Conditions of the MDV require the permittee to optimize phosphorus removal throughout the proposed permit term, comply with interim limits and make annual payments to participating county(s) by March 1 of each year based on the pounds of phosphorus discharged during the previous year in excess of the specified target value. A reopener clause is included in the permit to address the current MDV’s expiration date, as a permit action may be required to update or remove variance provisions if the MDV is altered or unavailable after February 6, 2027.

The “price per pound” value is \$50.00 adjusted for CPI annually during the first quarter as defined by s. 283.16(8)(a)2, Wis. Stats and takes effect for reissued permits with effective dates starting April 1. This may differ from the “price per pound” that is public noticed; however, the “price per pound” is set upon reissuance and is applicable for the entire permit term. The participating county(s) uses these payments to implement non-point source phosphorus control strategies at the watershed level.

**Total Nitrogen Monitoring (NO<sub>2</sub>+NO<sub>3</sub>, TKN and Total N):** The Department has included effluent monitoring for Total Nitrogen in the permit through the authority under §§ 283.55(1)(e), Wis. Stats., which allows the department to require the permittee to submit information necessary to identify the type and quantity of any pollutants discharged from the point source, and through s. NR 200.065(1)(h), Wis. Adm. Code, which allows for this monitoring to be collected during the permit term. More information on the justification to include total nitrogen monitoring in wastewater permits can be found in the “Guidance for Total Nitrogen Monitoring in Wastewater Permits” dated October 1, 2019. Monitoring for total nitrogen, nitrite + nitrate nitrogen and TKN is required annually in specific quarters to obtain seasonal variation.

**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, bimonthly monitoring is included. The initial determination of need sampling shall be conducted for up to two years in order to determine if the permitted discharge has the reasonable potential to cause or contribute to an exceedance of the PFOS or PFOA standards under s. NR 102.04(8)(d)1, Wis. Adm. Code.

**Whole Effluent Toxicity (WET):** Whole effluent toxicity (WET) testing requirements and limits (if applicable) are determined in accordance with ss. NR 106.08 and NR 106.09 Wis. Adm. Code, as revised August 2016. (See the current version of the Whole Effluent Toxicity Program Guidance Document and checklist and WET information, guidance and test methods at <http://dnr.wi.gov/topic/wastewater/wet.html>). Using this guidance, 2 Acute and annual Chronic WET tests with a monthly average of 1.0 are required.

### 3 Land Application - Monitoring and Limitations

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
002	B	Liquid	Unknown	Unknown	Unknown	Unknown
Does sludge management demonstrate compliance? Yes						
Is additional sludge storage required? No						

Municipal Sludge Description						
Sample Point	Sludge Class (A or B)	Sludge Type (Liquid or Cake)	Pathogen Reduction Method	Vector Attraction Method	Reuse Option	Amount Reused/Disposed (Dry Tons/Year)
Is Radium-226 present in the water supply at a level greater than 2 pCi/liter? No						
Is a priority pollutant scan required? No						

**Sample Point Number: 002- AERATED LAGOON SLUDGE**

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
Solids, Total		Percent	Once	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Once	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Once	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Once	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Once	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Once	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Once	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Once	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Once	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Once	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Once	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Once	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Once	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Once	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Once	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Once	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Once	Composite	
Nitrogen, Total Kjeldahl		Percent	Per Application	Composite	Prior to land application
Nitrogen, Ammonia (NH3-N) Total		Percent	Per Application	Composite	Prior to land application
Phosphorus, Total		Percent	Per Application	Composite	Prior to land application
Phosphorus, Water Extractable		% of Tot P	Per Application	Composite	Prior to land application
Potassium, Total Recoverable		Percent	Per Application	Composite	Prior to land application
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	
PFOA + PFOS		ug/kg	Once	Calculated	Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information.
PFAS Dry Wt			Once	Grab	Perfluoroalkyl and Polyfluoroalkyl Substances

Monitoring Requirements and Limitations					
Parameter	Limit Type	Limit and Units	Sample Frequency	Sample Type	Notes
					based on updated DNR PFAS List. See PFAS Permit Sections for more information.

### Changes from Previous Permit:

List 2 Nutrient monitoring – Monitoring for list 2 (nutrients) is highly recommended at the same time as the monitoring of List 1 (metals) in year 2 of the permit. Results will assist in the determination of the acres needed for land application of sludge should it be necessary. The number of acres needed is also required for the Land Treatment Management Schedule (see schedules for more information).

Change in form submittal – In prior permit reissuances when it has been noted in the application that sludge would not be removed during the permit term, the department required sampling during the second year of the permit term and the sludge characteristic report (3400-049) would be generated only during that year. Due to moving to electronic submittal of forms via Switchboard, forms 3400-049 (“Characteristics Report”), 3400-052 (“Other Methods of Disposal”) and 3400-055 (“Annual Land Application”) will now be generated by the department and the permittee will be required to submit all three reports each year of the permit term. This change was adopted to provide the permittee flexibility because many lagoon desludging projects can be unexpected, are delayed or staggered over multiple years. Additionally, it is used to officially report that no land application of sludge has occurred, and annual submittal of the forms is required per the standard requirements section.

PFAS sludge sampling has been included pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9., Wis. Adm. Code to quantitate risk.

### Explanation of Limits and Monitoring Requirements

Requirements for land application of municipal sludge are determined in accordance with ch. NR 204 Wis. Adm. Code. Ceiling and high quality limits for metals in sludge are specified in s. NR 204.07(5). Requirements for pathogens are specified in s. NR 204.07(6) and in s. NR 204.07 (7) for vector attraction requirements. Limitations for PCBs are addressed in s. NR 204.07(3)(k). Radium requirements are addressed in s. NR 204.07(3)(n).)

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

**Water Extractable Phosphorus-** Water extractable phosphorus (WEP) is the coefficient for determining plant available phosphorus from measured total phosphorus. In Wisconsin, the Penn State Method is utilized and is expressed in percent. While a total P may be significant, the WEP may show that only a small percentage of the P is available to plants because of factors such as treatment processes and chemical addition that “tie-up” phosphorus limiting the amount of phosphorus that is plant available. As part of the Wisconsin’s nutrient management plan (NMP) requirements, the accounting of all fertilizers must be included over the NMP cycle. The fertilizer value of the waste needs to be communicated to the farmer and accounted for in the NMP.

## 4 Schedules

### 4.1 Phosphorus Schedule - Continued Optimization

The permittee is required to optimize performance to control phosphorus discharges per the following schedule.

Required Action	Due Date
Optimization: The permittee shall continue to implement the optimization plan as previously approved to optimize performance to control phosphorus discharges. Submit a progress report on optimizing removal of phosphorus by the Due Date.	03/31/2025
Progress Report #2: Submit a progress report on optimizing removal of phosphorus.	03/31/2026
Progress Report #3: Submit a progress report on optimizing removal of phosphorus.	03/31/2027
Progress Report #4: Submit a progress report on optimizing removal of phosphorus.	03/31/2028
Progress Report #5: Submit a progress report on optimizing removal of phosphorus.	03/31/2029

#### 4.2 Phosphorus Multi-Discharger Variance Interim Limit (0.6 mg/L)

This compliance schedule requires the permittee to achieve compliance with the specified MDV interim effluent limit in accordance with s. 283.16(6), Wis. Stats., by the due date.

Required Action	Due Date
Construction Progress Report: Submit a progress report on construction.	09/30/2024
Complete Construction: Complete construction and initiate actions identified in the plan.	12/31/2024
Progress Report: Submit a progress report regarding what further actions are needed to achieve compliance with the interim limit.	12/31/2025
Complete Actions: Complete actions identified to achieve compliance with the specified interim effluent limit. Interim limit becomes effective January 1, 2027.	12/31/2026

#### 4.3 Phosphorus Payment per Pound to County

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

Required Action	Due Date
Annual Verification of Phosphorus Payment to County: The permittee shall make a total payment to the participating county or counties approved by the Department by March 1 of each calendar year. The amount due is equal to the following: [(lbs of phosphorus discharged minus the permittee's target value) times (\$64.75 per pound)] or \$640,000, whichever is less. See the payment calculation steps in the Surface Water section.  The permittee shall submit Form 3200-151 to the Department by March 1 of each calendar year indicating total amount remitted to the participating counties to verify that the correct payment was made. The first payment verification form is due by the specified Due Date.  Note: The applicable Target Value is 0.2 mg/L as defined by s. 283.16(1)(h), Wis. Stats. The "per pound" value is \$50.00 adjusted for CPI.	03/01/2025
Annual Verification of Payment #2: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2026
Annual Verification of Payment #3: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2027

Annual Verification of Payment #4: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2028
Annual Verification of Payment #5: Submit Form 3200-151 to the Department indicating total amount remitted to the participating counties.	03/01/2029
Continued Coverage: If the permittee intends to seek a renewed variance, an application for the MDV (Multi Discharger Variance) shall be submitted as part of the application for permit reissuance in accordance with s. 283.16(4)(b), Wis. Stats.	
Annual Verification of Payment After Permit Expiration: In the event that this permit is not reissued prior to the expiration date, the permittee shall continue to submit Form 3200-151 to the Department indicating total amount remitted to the participating counties by March 1 each year.	

#### 4.4 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
<p><b>Report on Effluent Discharge:</b> 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.</p> <p>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.</p>	03/31/2025
<p><b>Report on Effluent Discharge and Evaluation of Need:</b> 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.</p> <p>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.</p> <p>The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan.</p> <p>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.</p> <p>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.</p>	03/31/2026

### Explanation of Schedules

#### Continued Optimization

Per s. 283.16(6)(a), Wis. Stats. the Department may include a requirement that the permittee optimize the performance of a point source in controlling phosphorus discharges, which may be necessary to achieve compliance with multi-discharger variance interim limits. This compliance schedule requires the permittee to continue to implement the optimization plan that was approved during the previous permit term.

**Interim Limit (0.6 mg/L)**

Subsection 283.16(6), Wis. Stats., establishes required interim phosphorus effluent limits that must be met for multi-discharger variance (MDV) eligibility. The schedule above provides the permittee with two years to comply with that limit.

**County Payment**

Subsection 283.16(6)(b), Wis. Stats., requires permittees that have received approval for the multi-discharger variance (MDV) to implement a watershed project that is designed to reduce non-point sources of phosphorus within the HUC 8 watershed in which the permittee is located. The permittee has selected the “Payment to Counties” watershed option described in s. 283.16(8), Wis. Stats. Under this option the permittee shall make annual payment(s) to participating county(s) that are calculated based on the amount of phosphorus actually discharged during a calendar year in pounds per year less the amount of phosphorus that would have been discharged had the permittee discharged phosphorus at a target value concentration of 0.2 mg/L. The pounds of phosphorus discharged in excess of the target value is multiplied by a per pound phosphorus charge that will equal \$64.75 per pound. This schedule requires the permittee to submit Form 3200-151 to the Department indicating the total amount remitted to the participating county(s).

**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.

**Fact Check Comments:**

None

**Attachments:**

Water Quality Based Effluent Limits: Memo from Ben Hartenbower to Angela Parkhurst titled “Water Quality-Based Effluent Limitations for the Vesper Wastewater Treatment Facility WPDES Permit No. WI-0030309 dated December 21, 2023.

Dissipative cooling checklist and approval dated 12/21/2023.

MDV checklist and conditional approval dated 6/16/2023.

Public Notice: Daily Tribune, 220 1<sup>st</sup> Ave South, Wisconsin Rapids, WI 54492

**Expiration Date:**

March 31, 2029

**Justification Of Any Waivers From Permit Application Requirements**

N/A



**Prepared By: Angela Parkhurst Wastewater Specialist**

**Date: February 12, 2024**

# CORRESPONDENCE/MEMORANDUM

DATE: December 21, 2023

TO: Angela Parkhurst– WCR/Eau Claire

FROM: Benjamin Hartenbower – WCR/Eau Claire

SUBJECT: Water Quality-Based Effluent Limitations for the Vesper Wastewater Treatment Facility  
WPDES Permit No. WI-0030309

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 Vesper Wastewater Treatment Facility in Wood County. This municipal wastewater treatment facility (WWTF) discharges to Hemlock Creek, located in the Hemlock Creek Watershed in the Central Wisconsin River Basin. This discharge is included in the Wisconsin River TMDL as approved by EPA on April 26, 2019 with site-specific criteria approved by EPA on July 9, 2020. 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 Outfall 003:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD <sub>5</sub>	30 mg/L			15 mg/L		1
TSS	30 mg/L			20 mg/L		1
pH	9.0 s.u.	6.0 s.u.				1
Dissolved Oxygen		4.0 mg/L				1
Ammonia Nitrogen	Variable		<b>5.3 mg/L</b>	<b>5.3 mg/L</b>		3,4
Bacteria <i>E. coli</i>				126#/100 mL geometric mean		5
Copper						2
Chloride						2
Temperature						2
PFOS and PFOA						6
Phosphorus Interim MDV Interim TMDL Limit				1.0 mg/L 0.6 mg/L 0.60 lbs/day	0.20 lbs/day	7
TKN, Nitrate+Nitrite, and Total Nitrogen						8
Acute WET						9
Chronic WET				1.0 TUc		9,10

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. Additional limits to comply with the expression of limits requirements in ss. NR 106.33(2) and NR 205.065(7), Wis. Adm. Codes, are included in bold.

4. The variable daily maximum ammonia nitrogen limit table corresponding to various effluent pH values may be included in the permit in place of the single limit. These limits apply year-round.

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
6.0 ≤ pH ≤ 6.1	56	7.0 < pH ≤ 7.1	34	8.0 < pH ≤ 8.1	7.2
6.1 < pH ≤ 6.2	55	7.1 < pH ≤ 7.2	31	8.1 < pH ≤ 8.2	6.0
6.2 < pH ≤ 6.3	54	7.2 < pH ≤ 7.3	27	8.2 < pH ≤ 8.3	4.9
6.3 < pH ≤ 6.4	53	7.3 < pH ≤ 7.4	24	8.3 < pH ≤ 8.4	4.0
6.4 < pH ≤ 6.5	51	7.4 < pH ≤ 7.5	21	8.4 < pH ≤ 8.5	3.3
6.5 < pH ≤ 6.6	49	7.5 < pH ≤ 7.6	18	8.5 < pH ≤ 8.6	2.8
6.6 < pH ≤ 6.7	46	7.6 < pH ≤ 7.7	15	8.6 < pH ≤ 8.7	2.3
6.7 < pH ≤ 6.8	44	7.7 < pH ≤ 7.8	13	8.7 < pH ≤ 8.8	1.9
6.8 < pH ≤ 6.9	41	7.8 < pH ≤ 7.9	11	8.8 < pH ≤ 8.9	1.6
6.9 < pH ≤ 7.0	38	7.9 < pH ≤ 8.0	8.7	8.9 < pH ≤ 9.0	1.4

5. Bacteria limits apply during the disinfection season of May-September. Additional limit: No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 count/100 mL.
6. Monitoring once every two months is required in accordance with s. NR 106.98(2), Wis. Adm. Code.
7. Under the phosphorus MDV, the current interim limit of 1.0 mg/L should be effective upon permit reissuance. A compliance schedule may be included in the permit until the highest attainable condition (HAC) limit of 0.6 mg/L can be met. The final TMDL based limits remain at 0.60 lbs/day as a monthly average and 0.20 lbs/day as a six-month average.
8. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, annual total nitrogen monitoring is recommended for all minor municipal permittees. Total Nitrogen is the sum of nitrate (NO<sub>3</sub>), nitrite (NO<sub>2</sub>), and total kjeldahl nitrogen (TKN) (all expressed as N).
9. Two Acute and annual Chronic WET tests are recommended in the reissued permit. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).
10. The Instream Waste Concentration (IWC) to assess chronic test results is 98%. 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%, 75%, 50%, 25% & 12.5% and the dilution water used in WET tests conducted on Outfall 003 shall be a grab sample collected from Hemlock Creek.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Benjamin Hartenbower at (715) 225-4705 or Benjamin.Hartenbower@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (3) – Narrative, Thermal Table, & Map

PREPARED BY: \_\_\_\_\_ Date: \_\_\_\_\_  
 Benjamin Hartenbower, PE,  
 Water Resources Engineer

E-cc:

Logan Rubeck, Wastewater Engineer – WCR/Eau Claire  
Geisa Thielen, Regional Wastewater Supervisor – WCR/Eau Claire  
Diane Figiel, Water Resources Engineer – WY/3  
Scott Provost, Water Quality Biologist – WCR/Wisconsin Rapids  
Kari Fleming, Environmental Toxicologist – WY/3  
Michael Polkinghorn, Water Resources Engineer – NOR/Rhineland  
Nate Willis, Wastewater Engineer – WY/3

**Water Quality-Based Effluent Limitations for  
the Vesper Wastewater Treatment Facility  
WPDES Permit No. WI-0030309**

Prepared by: Benjamin P. Hartenbower

**PART 1 – BACKGROUND INFORMATION**

**Facility Description:**

The Vesper Wastewater Treatment Facility is an aerated lagoon system with two ponds that treats domestic wastewater from the Village of Vesper and pretreated effluent from Kerry Ingredients (a cheese and non-dairy creamer producer). Both the primary and secondary ponds are aerated and have baffles across them to enhance treatment and prevent short circuiting. Rotating biological contactor (RBC) units are between the two ponds to provide ammonia removal. Chemical addition is used for phosphorus removal. Effluent is treated seasonally with UV disinfection before discharge to Hemlock Creek.

Attachment #3 is a map of the area showing the approximate location of Outfall 003.

**Existing Permit Limitations**

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

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Footnotes
Flow Rate					1,2
BOD <sub>5</sub>	30 mg/L			15 mg/L	1
TSS	30 mg/L			20 mg/L	1
pH	9.0 s.u.	6.0 s.u.			1
Dissolved Oxygen		4.0 mg/L			1
Ammonia Nitrogen	5.3 mg/L		5.3 mg/L	5.3 mg/L	
Fecal Coliform May-September			656#/100 mL geometric mean	400#/100 mL geometric mean	
Copper					2
Temperature					2
Phosphorus Interim HAC Interim Limit				1.8 mg/L 1.0 mg/L	3
Acute WET					4
Chronic WET					5

Footnotes:

Attachment #1

1. 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.
2. Monitoring only.
3. Under the phosphorus MDV, a highest attainable condition (HAC) limit of 1.0 mg/L was effective October 1, 2022.
4. Acute WET testing required: Oct - Dec 2019 and July - Sept 2022.
5. Chronic WET testing required: Oct - Dec 2019, Apr - June 2021, and July - Sept 2022. The IWC for chronic WET was 98%.

**Receiving Water Information**

- Name: Hemlock Creek
- Waterbody Identification Code (WBIC): 1366300
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Limited Forage Fish (LFF), non-public water supply. Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: USGS for Station 05402170 at Vesper, in Hemlock Creek
  - 7-Q<sub>10</sub> = 0.008 cfs (cubic feet per second)
  - 7-Q<sub>2</sub> = 0.05 cfs
  - Harmonic Mean Flow = 0.64 cfs using a drainage area of 41.2 mi<sup>2</sup>.
  - The Harmonic Mean has been estimated based on average flow and the 7-Q<sub>10</sub> using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).
- Hardness = 137 mg/L as CaCO<sub>3</sub>. This value represents a 98% calculated effluent mix combined with the geometric mean of 19 samples collected in the receiving water from WET testing from 06/01/2006 to 08/09/2022.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from East Fork Black River at Hatfield is used for this evaluation because there is no data available for Hemlock Creek and the East Fork Black River is within the same ecological landscape so ambient water quality characteristics are expected to be similar. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: The Arpin WWTF also discharges to Hemlock Creek, 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: This discharge is located within the Wisconsin River TMDL for phosphorus

**Effluent Information:**

- Design Flow Rates(s):  
Annual Average = 0.103 MGD (Million Gallons per Day)  
For reference, the actual average flow from October 2018 to October 2023 was 0.108 MGD.
- Hardness = 137 mg/L as CaCO<sub>3</sub>. This value represents the geometric mean of 4 effluent samples collected from 11/27/2022 to 12/08/2023.
- 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: Domestic wastewater with water supply from the wells and non-domestic contribution from Kerry Ingredients.
- Additives: Cerium Lanthanum Chloride (Aqua Hawk RE2)
- Total Phosphorus Wasteload Allocation: 59 lbs/year = 0.162 lbs/day
- Effluent characterization: This facility is categorized as a minor municipality, 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 Chloride and hardness. The permit-required monitoring for Ammonia, Copper, and Phosphorus from October 2018 to October 2023 is used in this evaluation.

**Chemical Specific Effluent Data at Outfall 003**

	Copper µg/L
1-day P <sub>99</sub>	21.92
4-day P <sub>99</sub>	13.17
30-day P <sub>99</sub>	8.76
Mean	6.75
Std	4.25
Sample size	19
Range	0.93 - 14

**Chemical Specific Effluent Data at Outfall 003**

Sample Date	Chloride mg/L
09/11/2011	178
09/15/2011	180
09/18/2011	176
09/22/2011	189
02/05/2017	427
02/10/2017	147
02/13/2017	144
02/16/2017	136
11/27/2022	188
12/01/2022	184
12/04/2022	200
12/08/2022	198

Attachment #1

Sample Date	Chloride mg/L
1-day P <sub>99</sub>	436
4-day P <sub>99</sub>	300

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

The following table presents the average concentrations and loadings at Outfall 003 from October 2018 to October 2023 for all parameters with limits in the current permit to meet the requirements of s. NR 201.03(6):

**Parameter Averages with Limits**

	Average Measurement
BOD <sub>5</sub>	4 mg/L*
TSS	8 mg/L*
pH	8.22 s.u.
Dissolved Oxygen	10.64 mg/L
Ammonia Nitrogen	0.172 mg/L*
Fecal Coliform	20#/100 mL
Phosphorus	0.63 mg/L*

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

**PART 2 – WATER QUALITY-BASED Effluent Limitations for Toxic Substances – EXCEPT AMMONIA NITROGEN**

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

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

**Acute Limits based on 1-Q<sub>10</sub>**

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



$$\text{Limitation} = \frac{(\text{WQC}) (Q_s + (1-f) Q_e) - (Q_s - f Q_e) (C_s)}{Q_e}$$

Where:

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

Q<sub>s</sub> = average minimum 1-day flow which occurs once in 10 years (1-day Q<sub>10</sub>)  
 if the 1-day Q<sub>10</sub> flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q<sub>10</sub>).

Q<sub>e</sub> = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

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

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

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q<sub>10</sub> method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is the case for the City of Vesper Wastewater Treatment Facility.

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).

**Daily Maximum Limits based on Acute Toxicity Criteria (ATC)**

RECEIVING WATER FLOW = 0.006 cfs, (1-Q<sub>10</sub> (estimated as 80% of 7-Q<sub>10</sub>)), as specified in s. NR 106.06 (3) (bm), Wis. Adm. Code.

SUBSTANCE	REF. HARD. mg/L	ATC	MEAN BACK-GRD.	MAX. EFFL. LIMIT**	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P <sub>99</sub>	1-day MAX. CONC.
Arsenic		339.8		353	70.7	<0.989		
Cadmium	137	14.84	0.047	15	3.1	<0.19		
Chromium (+3)	137	2339.36	0.995	2433	486.7	<1.1		
Copper	137	20.94	1.237	22			21.9	14
Lead	137	145.37	0.647	151	30.2	<4.3		
Nickel	137	613.98		639	127.7	<1.2		
Zinc	137	158.96	8.012	165	33	15		
Chloride		757		787			436	427

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

Attachment #1

**Weekly Average Limits based on Chronic Toxicity Criteria (CTC)**

RECEIVING WATER FLOW = 0.002 cfs (¼ of the 7-Q<sub>10</sub>), as specified in s. NR 106.06 (4) (c), Wis. Adm. Code

SUBSTANCE	REF. HARD.* mg/L	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P <sub>99</sub>
Arsenic		152.2		154.1	30.8	<0.989	
Cadmium	137	3.15	0.047	3.2	0.6	<0.19	
Chromium (+3)	137	170.6	0.995	172.7	34.5	<1.1	
Copper	137	13.52	1.237	13.7			13.2
Lead	137	37.87	0.647	38.3	7.7	<4.3	
Nickel	137	67.97		68.8	13.8	<1.2	
Zinc	137	158.17	8.012	160	32	15	
Chloride		395		400			300

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

**Monthly Average Limits based on Wildlife Criteria (WC)**

The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

**Monthly Average Limits based on Human Threshold Criteria (HTC)**

RECEIVING WATER FLOW = 0.16 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

SUBSTANCE	HTC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Cadmium	370	0.047	705	141	<0.19
Chromium	3818000	0.995	7270205	1454041	<1.1
Lead	140	0.647	266	53.2	<4.3
Nickel	43000		81880	16376	<1.2

**Monthly Average Limits based on Human Cancer Criteria (HCC)**

RECEIVING WATER FLOW = 0.16 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

SUBSTANCE	HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Arsenic	13.3		25.326	5.065	<0.989

Attachment #1

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, limits are not required for toxic substances.

Copper and Chloride – **Quarterly monitoring is recommended.**

PFOS and PFOA – The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98, Wis. Adm. Code. Based on the nondomestic contribution, **PFOS and PFOA monitoring is recommended once every two months.**

Mercury – The permit application did not require monitoring for mercury because the Vesper Wastewater Treatment Facility is categorized as a minor facility as defined in s. NR 200.02(8), Wis. Adm. Code. In accordance with s. NR 106.145(3)(a)3., Wis. Adm. Code, a minor municipal discharger shall monitor, and report results of influent and effluent mercury monitoring once every three months if, there are two or more exceedances in the last five years of the high-quality sludge mercury concentration of 17 mg/kg specified in s. NR 204.07(5). A review of the past five years of sludge characteristics data reveals that all the sample results are within expected analytical ranges and well below the 17 mg/kg level. The average concentration in the sludge from 2020 was 0.80 mg/kg, with a maximum reported concentration of 0.80 mg/kg. Therefore, **no mercury monitoring is recommended at Outfall 003.**

### **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. The current permit has daily maximum, weekly average, and monthly average limits. These limits are re-evaluated at this time due to the following changes:

- Subchapter IV of ch. NR 106, Wis. Adm. Code allows limits based on available dilution instead of limits set to twice the acute criteria.
- Section NR 106.07(3), Wis. Adm. Code requires weekly and monthly average limits for municipal treatment plants.
- The maximum expected effluent pH has changed

#### **Daily Maximum Limits based on Acute Toxicity Criteria (ATC):**

Daily maximum limitations are based on acute toxicity criteria in ch. NR 105, Wis. Adm. Code, which are a function of the effluent pH and the receiving water classification. The acute toxicity criterion (ATC) for ammonia is calculated using the following equation.

$$\text{ATC in mg/L} = [A \div (1 + 10^{(7.204 - \text{pH})})] + [B \div (1 + 10^{(\text{pH} - 7.204)})]$$

Where:

A = 0.411 and B = 58.4 for a Limited Forage Fishery, and  
pH (s.u.) = that characteristic of the effluent.

The effluent pH data was examined as part of this evaluation. A total of 533 sample results were reported from October 2018 to October 2023. The maximum reported value was 8.99 s.u. (Standard pH Units). The effluent pH was 8.95 s.u. or less 99% of the time. The 1-day P<sub>99</sub>, calculated in accordance with s. NR 106.05(5), Wis. Adm. Code, is 9.12 s.u. The mean plus the standard deviation multiplied by a factor of 2.33, an estimate of the upper ninety ninth percentile for a normally distributed dataset, is 9.08 s.u. Therefore, a value of 8.99 s.u. is believed to represent the maximum reasonably expected pH, and therefore most appropriate for determining daily maximum limitations for ammonia nitrogen. Substituting a value of 8.99 s.u. into the equation above yields an ATC = 1.34 mg/L.

**Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method**

In accordance with s. NR 106.32(2), Wis. Adm. Code daily maximum ammonia limitations are calculated using the 1-Q<sub>10</sub> receiving water low flow if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. The more restrictive calculated limits shall apply.

The calculated daily maximum ammonia nitrogen effluent limits using the mass balance approach with the 1-Q<sub>10</sub> (estimated as 80 % of 7-Q<sub>10</sub>) and the 2×ATC approach are shown below.

**Daily Maximum Ammonia Nitrogen Determination**

	Ammonia Nitrogen Limit mg/L
2×ATC	2.69
1-Q <sub>10</sub>	1.40

The 1-Q<sub>10</sub> method yields the most stringent limits for the Vesper Wastewater Treatment Facility.

Presented below is a table of daily maximum limitations corresponding to various effluent pH values. Use of this table is not necessarily recommended in the permit, but it is presented herein for informational purposes.

**Daily Maximum Ammonia Nitrogen Limits – LFF**

Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L	Effluent pH s.u.	Limit mg/L
6.0 ≤ pH ≤ 6.1	56	7.0 < pH ≤ 7.1	34	8.0 < pH ≤ 8.1	7.2
6.1 < pH ≤ 6.2	55	7.1 < pH ≤ 7.2	31	8.1 < pH ≤ 8.2	6.0
6.2 < pH ≤ 6.3	54	7.2 < pH ≤ 7.3	27	8.2 < pH ≤ 8.3	4.9
6.3 < pH ≤ 6.4	53	7.3 < pH ≤ 7.4	24	8.3 < pH ≤ 8.4	4.0
6.4 < pH ≤ 6.5	51	7.4 < pH ≤ 7.5	21	8.4 < pH ≤ 8.5	3.3
6.5 < pH ≤ 6.6	49	7.5 < pH ≤ 7.6	18	8.5 < pH ≤ 8.6	2.8
6.6 < pH ≤ 6.7	46	7.6 < pH ≤ 7.7	15	8.6 < pH ≤ 8.7	2.3
6.7 < pH ≤ 6.8	44	7.7 < pH ≤ 7.8	13	8.7 < pH ≤ 8.8	1.9
6.8 < pH ≤ 6.9	41	7.8 < pH ≤ 7.9	11	8.8 < pH ≤ 8.9	1.6
6.9 < pH ≤ 7.0	38	7.9 < pH ≤ 8.0	8.7	8.9 < pH ≤ 9.0	1.4

**Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)**

The ammonia limit calculation also warrants evaluation of weekly and monthly average limits based on chronic toxicity criteria for ammonia, since those limits relate to the assimilative capacity of the receiving water.

Weekly average and monthly average limits for ammonia nitrogen are based on chronic toxicity criteria in ch. NR 105, Wis. Adm. Code.

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as Limited Forage Fish Community is calculated by the following equation, according to subchapter IV of NR 106, Wis. Adm. Code.

$$CTC = E \times \{ [0.0676 \div (1 + 10^{(7.688 - pH)})] + [2.912 \div (1 + 10^{(pH - 7.688)})] \} \times C$$

Where:

pH = the pH (s.u.) of the receiving water,

E = 1.0,

C = the minimum of 3.09 or  $3.73 \times 10^{(0.028 \times (25 - T))}$  – (Early Life Stages Present), or

C =  $3.73 \times 10^{(0.028 \times (25 - T))}$  – (Early Life Stages Absent), and

T = the temperature (°C) of the receiving water – (Early Life Stages Present), or

T = the maximum of the actual temperature (°C) and 7 - (Early Life Stages Absent)

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-Q<sub>10</sub> (4-Q<sub>3</sub>, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-Q<sub>5</sub> (estimated as 85% of the 7-Q<sub>2</sub> if the 30-Q<sub>5</sub> is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the flow is used if the Temperature ≥ 16 °C, 25% of the flow is used if the Temperature < 11 °C, and 50% of the flow is used if the Temperature ≥ 11 °C but < 16 °C.

Section NR 106.32 (3), Wis. Adm. Code, provides a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 °C, during the winter and spring months. Burbot, an early spawning species, are not believed to be present in Hemlock Creek. So “ELS Absent” criteria apply from October through March, and “ELS Present” criteria will apply from April through September for a LFF classification.

The “default” basin assumed values are used for temperature and background ammonia concentrations, because minimum ambient data is available. The values for pH are based on data collected from Hemlock Creek. These values are shown in the table below, with the resulting criteria and effluent limitations.

**Weekly and Monthly Ammonia Nitrogen Limits – LFF**

		<b>April &amp; May</b>	<b>June-September</b>	<b>October-March</b>
<b>Effluent Flow</b>	Qe (MGD)	0.103	0.103	0.103
<b>Background Information</b>	7-Q <sub>10</sub> (cfs)	0.008	0.008	0.008
	7-Q <sub>2</sub> (cfs)	0.05	0.05	0.05
	Ammonia (mg/L)	0.07	0.04	0.14
	Temperature (°C)	15.0	20.6	12.8
	pH (s.u.)	7.45	7.41	7.54
	% of Flow used	50	100	25
	Reference Weekly Flow (cfs)	0.004	0.008	0.002
	Reference Monthly Flow (cfs)	0.021	0.043	0.011
<b>Criteria mg/L</b>	4-day Chronic			
	Early Life Stages Present	14.50	14.93	13.40
	Early Life Stages Absent	33.36	24.00	35.58
	30-day Chronic			
	Early Life Stages Present	5.80	5.97	5.36
	Early Life Stages Absent	13.34	9.60	14.23
<b>Effluent Limitations mg/L</b>	Weekly Average			
	Early Life Stages Present	14.87	15.68	
	Early Life Stages Absent			36.02
	Monthly Average			
	Early Life Stages Present	6.57	7.55	
	Early Life Stages Absent			15.17

**Effluent Data**

The following table evaluates the statistics based upon ammonia data reported from October 2018 to October 2023, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Vesper Wastewater Treatment Facility permit for the respective month ranges.

**Ammonia Nitrogen Effluent Data**

Ammonia Nitrogen mg/L	<b>April &amp; May</b>	<b>June-September</b>	<b>October-March</b>
1-day P <sub>99</sub>	2.66	0.83	1.47
4-day P <sub>99</sub>	1.53	0.45	0.81
30-day P <sub>99</sub>	0.64	0.22	0.36
Mean*	0.24	0.12	0.18
Std	0.80	0.20	0.36
Sample size	42	82	130
Range	<0.13 - 3.83	<0.13 - 1.15	<0.13 - 3.099

\*Values lower than the level of detection were substituted with a zero.

Based on this comparison, a daily maximum limit of 1.4 mg/L is required.

**Expression of Limits**

Revisions to ch. NR 106, Wis. Adm. Code, in September 2016 aligned Wisconsin’s WQBELs with 40 CFR § 122.45(d), which specifies that effluent limits for continuous dischargers must be expressed as weekly and monthly averages for publicly owned treatment works and as daily maximums and monthly averages for all other dischargers, unless shown to be impracticable. Because a daily maximum ammonia limit is necessary for the Vesper Wastewater Treatment Facility, weekly and monthly average limits are also required under this code revision.

The methods for calculating limitations for municipal treatment facilities to conform to 40 CFR 122.45(d) are specified in s. NR 106.07(3), Wis. Adm. Code, and are as follows:

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

Therefore weekly and monthly average limits of 1.4 mg/L are required to meet expression of limits requirements in addition to the daily max limit.

**Conclusions and Recommendations**

In summary, after rounding to two significant figures, the following ammonia nitrogen limitations are recommended. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.

**Final Ammonia Nitrogen Limits**

Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
1.4	<b>1.4</b>	<b>1.4</b>

Alternatively, if the variable daily maximum ammonia nitrogen limit table is included in place of the single limit, the following ammonia nitrogen limitations are recommended. Weekly and monthly average limitations would be set equal to the highest variable daily maximum limit of 56 mg/L, except when more restrictive limits are already determined necessary to protect water quality.

**Final Ammonia Nitrogen Limits**

Daily Maximum mg/L	Weekly Average mg/L	Monthly Average mg/L
Variable	<b>15</b>	<b>6.6</b>

The calculated weekly and monthly average ammonia limits are less restrictive than the limits of 5.3 mg/L in the current permit. Without a demonstration of need for a higher limit in accordance with s. NR 207.04, Wis. Adm. Code, the **current weekly and monthly limits must be continued in the reissued permit.**

## **PART 4 – WATER QUALITY-BASED Effluent Limitations for BACTERIA**

On May 1, 2020, revisions to chs. NR 102 and NR 210, Wis. Adm. Codes, became effective which replace fecal coliform limits with new *Escherichia coli* (*E. coli*) limits for protection of recreational uses. Section NR 210.06(2)(a)1, Wis. Adm. Code, includes two limits which must be included in permits for facilities which are required to disinfect:

1. The geometric mean of *E. coli* bacteria in effluent samples collected in any calendar month may not exceed 126 counts/100 mL.
2. No more than 10 percent of *E. coli* bacteria samples collected in any calendar month may exceed 410 counts/100 mL.

*E. coli* monitoring is recommended at the same frequency that fecal coliform monitoring is required in the current permit. Because the Vesper Wastewater Treatment Facility permit requires weekly monitoring, the 410 counts/100 mL limit will effectively function as a daily maximum limit unless the facility performs additional monitoring. Any additional monitoring beyond what is required by the permit must also be reported on the DMR as required in the standard requirements section of the permit.

These limits are required during May through September. No changes are recommended to the required disinfection season.

### **Effluent Data**

The Vesper Wastewater Treatment Facility has monitored effluent *E. coli* from May 2022 to September 2022 and a total of 18 results are available. A geometric mean of 126 counts/100 mL was never exceeded, with a maximum monthly geometric mean of 8 counts/100 mL. Effluent data never exceeded 410 counts/100 mL. The maximum reported value was 30 counts/100 mL. Based on this effluent data it appears that **the facility can meet new *E. coli* limits and a compliance schedule is not needed in the reissued permit.**

## **PART 5 – PHOSPHORUS**

### **Technology-Based Effluent Limit**

Subchapter II of Chapter NR 217, Wis. Adm. Code, requires municipal wastewater treatment facilities that discharge greater than 150 pounds of Total Phosphorus per month to comply with a monthly average limit of 1.0 mg/L, or an approved alternative concentration limit.

Because the Vesper Wastewater Treatment Facility does not currently have an existing technology-based limit, the need for this limit in the reissued permit is evaluated. The data demonstrates that the annual monthly average phosphorus loading is less than 150 lbs/month, which is the threshold for municipalities in accordance to s. NR 217.04(1)(a)1, Wis. Adm. Code, and therefore a technology-based limit is not required.



**Annual Average Mass Total Phosphorus Loading**

Month	Monthly Avg. mg/L	Total Flow MG/month	Total Phosphorus lb./mo.
Nov 2022	0.07	3.11	1.69
Dec 2022	0.15	3.19	3.99
Jan 2023	0.26	3.68	7.88
Feb 2023	0.27	3.21	7.17
Mar 2023	0.38	4.44	13.90
Apr 2023	0.46	6.28	23.90
May 2023	0.52	4.60	19.76
Jun 2023	0.31	1.79	4.56
Jul 2023	0.04	1.64	0.56
Aug 2023	0.05	1.76	0.78
Sep 2023	0.08	1.84	1.27
Oct 2023	0.18	3.86	5.72
Average =			<b>7.60</b>

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

**TMDL Limits – Phosphorus**

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

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

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

equivalent effluent concentration:

$$\begin{aligned} \text{TP Equivalent Effluent Concentration} &= \text{Daily WLA} \div (\text{Flow Rate} * \text{Conversion Factor}) \\ &= 0.162 \text{ lbs/day} \div (0.103 \text{ MGD} * 8.34) \\ &= 0.19 \text{ mg/L} \end{aligned}$$

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

$$\begin{aligned} \text{TP 6-Month Average Permit Limit} &= \text{Daily WLA} * \text{6-Month average multiplier} \\ &= 0.162 \text{ lbs/day} * 1.21 \\ &= 0.20 \text{ lbs/day} \end{aligned}$$

$$\begin{aligned} \text{TP Monthly Average Permit Limit} &= \text{TP 6-Month Average Permit Limit} * 3 \\ &= 0.20 \text{ lbs/day} * 3 \\ &= 0.60 \text{ lbs/day} \end{aligned}$$

The multiplier used in the six-month average calculation was determined according to TMDL implementation guidance. A coefficient of variation was calculated, based on phosphorus mass monitoring data, to be 0.86. The facility is not able to meet the permit limits based on the WLA, so a standard CV of 0.6 is used. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as twice weekly; if a different monitoring frequency is used, the stated limits should be reevaluated.

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

Since wasteload allocations are expressed as annual loads (lbs/yr), permits with TMDL-derived monthly average permit limits should require the permittee to calculate and report rolling 12-month sums of total monthly loads for TP. Rolling 12-month sums can be compared directly to the annual wasteload allocation. Six-month average limits apply in the periods May – October and November – April.

**Total Phosphorus Statistics**

	Concentration (mg/L)	Mass Discharge (lbs/day)
1-day P <sub>99</sub>	2.25	2.55
4-day P <sub>99</sub>	1.32	1.44
30-day P <sub>99</sub>	0.84	0.85
Mean	0.63	0.60
Std	0.44	0.51
Sample Size	507	507
Range	<0.011 - 2.52	0.01 - 3.01

**Conclusions:**

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

- Monthly average Total Phosphorus mass limit of 0.60 lbs/day
- Six-month average Total Phosphorus mass limit of 0.20 lbs/day

**Multi-Discharge Variance Interim Limit**

With the permit application, the Village of Vesper has re-applied for the phosphorus multi-discharger variance (MDV). Conditions of the phosphorus MDV require the facility to comply with an interim phosphorus limit in lieu of meeting the final WQBEL. The recommended interim limit during the 2<sup>nd</sup> permit under MDV approval, pursuant to s. 283.16 (6), Wis. Stats., is 0.60 mg/L as a monthly average. A compliance schedule may be appropriate to meet this interim limit but compliance with 0.6 mg/L shall be no later than the end of the reissued permit. The current interim limit of 1.0 mg/L as a monthly average should not be exceeded during the compliance schedule.

**PART 6 – 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 October 2018 to October 2023.

The table below summarizes the maximum temperatures reported during monitoring from January 2021 to December 2021.

**Monthly Temperature Effluent Data & Limits**

Month	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)
JAN	42	42	54	78
FEB	41	41	54	79
MAR	60	64	<b>57</b>	80
APR	56	56	63	81
MAY	69	69	70	84
JUN	71	75	77	85
JUL	72	73	81	86
AUG	72	73	79	86
SEP	65	68	73	85
OCT	64	64	<b>63</b>	83
NOV	48	51	54	80
DEC	44	46	54	79

**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, weekly average temperature limits are necessary for March and October. The complete thermal table used for the limit calculation is attached.

The Village of Vesper has submitted a request for consideration of dissipative cooling, including additional data collected in 2023. Based on this information, the department has found that it is not necessary to include temperature limits in the reissued permit. **Temperature monitoring is recommended** per the requirements of s. NR 106.59(7), Wis. Adm. Code.

**Future WPDES Permit Reissuance**

Dissipative cooling requests must be re-evaluated every permit reissuance. The permittee is responsible for submitting an updated DC request prior to permit reissuance. Such a request must either include:

- a) A statement by the permittee that there have been no substantial changes in operation of, or thermal loadings to, the treatment facility and the receiving water; or
- b) New information demonstrating DC to supplement the information used in the previous DC determination. If significant changes in operation or thermal loads have occurred, additional DC data must be submitted to the Department.

**PART 7 – 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 LC50 (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<sub>25</sub> (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of **98%** shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

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

Where:

Q<sub>e</sub> = annual average flow = 0.103 MGD = 0.159 cfs

f = fraction of the Q<sub>e</sub> withdrawn from the receiving water = 0

Q<sub>s</sub> = ¼ of the 7-Q<sub>10</sub> = 0.008 cfs ÷ 4 = 0.002 cfs

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual*, 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.

Attachment #1

- 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 003 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge. The specific receiving water location must be specified in the WPDES permit.
- Shown below is a tabulation of all available WET data for Outfall 003. Efforts are made to ensure that decisions about WET monitoring and limits are made based on representative data, as specified in s. NR 106.08(3), Wis. Adm Code. Data which is not believed to be representative of the discharge was not included in reasonable potential calculations. The table below differentiates between tests used and not used when making WET determinations.

**WET Data History**

Date	Acute Results LC <sub>50</sub> %				Chronic Results IC <sub>25</sub> %					Footnotes  or Comments
	Test Initiated	<i>C. dubia</i>	Fathead minnow	Pass or Fail?	Used in RP?	<i>C. dubia</i>	Fathead Minnow	Algae (IC50)	Pass or Fail?	
06/01/2006					<b>76.24</b>	>100		Fail	Yes	
07/27/2006					>100	>100		Pass	Yes	
08/29/2006					>100	>100		Pass	Yes	
09/18/2007	>100	>100	Pass	Yes	>100	>100		Pass	Yes	
11/18/2008					>100	>100		Pass	Yes	
01/13/2009	>100	>100	Pass	Yes	>100	>100		Pass	Yes	
06/08/2010					<b>46</b>	>100		Fail	Yes	
07/15/2010					>100	>100		Pass	Yes	
08/10/2010					>100	>100		Pass	Yes	
07/26/2011					>100	>100		Pass	Yes	
10/30/2012					>100	>100		Pass	Yes	
08/04/2015					>100	>100		Pass	Yes	
11/08/2016					<b>97.5</b>			Fail	Yes	
12/13/2016					>100	>100		Pass	Yes	
12/20/2016					>100			Pass	Yes	
10/08/2019	>100	>100	Pass	Yes	<b>48.1</b>	>100		Fail	Yes	
12/03/2019					>100	>100		Pass	Yes	
12/10/2019					>100	>100		Pass	Yes	
06/22/2021					>100	>100		Pass	Yes	
08/09/2022	>100	>100	Pass	Yes						

Attachment #1

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

$$\text{Acute Reasonable Potential} = [(TU_a \text{ effluent})(B)]$$

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

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

$$\text{Chronic Reasonable Potential} = [(TU_c \text{ effluent})(B)(IWC)]$$

**Chronic WET Limit Parameters**

TU <sub>c</sub> (maximum) 100/IC <sub>25</sub>	B (multiplication factor from s. NR 106.08(6)(c), Wis. Adm. Code, Table 4)	IWC
100/46.0 = 2.2 TU <sub>c</sub>	2.6 Based on 4 detects	98%

$$[(TU_c \text{ effluent})(B)(IWC)] = 5.5 > 1.0$$

Therefore, reasonable potential is shown for a chronic WET limit using the procedures in s. NR 106.08(6) and representative data from 2006 to 2021.

Expression of WET limits

$$\text{Chronic WET limit} = [100/IWC] TU_c = 100/98 = \mathbf{1.0 TU_c \text{ expressed as a monthly average}}$$

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>.

Attachment #1  
**WET Checklist Summary**

	<b>Acute</b>	<b>Chronic</b>
<b>AMZ/IWC</b>	Not Applicable. <b>0 Points</b>	IWC = 98 % <b>15 Points</b>
<b>Historical Data</b>	Four tests used to calculate RP. No tests failed. <b>0 Points</b>	19 tests used to calculate RP. 4/19 tests failed. <b>0 Points</b>
<b>Effluent Variability</b>	Periodic violations for TSS. (5 pts) <b>5 Points</b>	Same as Acute. <b>5 Points</b>
<b>Receiving Water Classification</b>	< 4 mi to WWSF (5 pts) <b>5 Points</b>	Same as Acute. <b>5 Points</b>
<b>Chemical-Specific Data</b>	Reasonable potential for Ammonia limit based on ATC; (5 pts) Chloride, Copper, and Zinc detected. (3 pts) Additional Compounds of Concern: None <b>8 Points</b>	No reasonable potential for limits based on CTC; Ammonia nitrogen limit carried over from the current permit. Chloride, Copper, and Zinc detected.(3 pts) Additional Compounds of Concern: None <b>3 Points</b>
<b>Additives</b>	One Water Quality Conditioners added. (1 pt) Permittee has proper P chemical SOPs in place <b>1 Point</b>	Additive used more than once per 4 days. <b>1 Point</b>
<b>Discharge Category</b>	One Industrial Contributor. (5 pts) <b>5 Points</b>	Same as Acute. (5 pts) <b>5 Points</b>
<b>Wastewater Treatment</b>	Secondary or Better <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Downstream Impacts</b>	No impacts known (0 pts) <b>0 Points</b>	Same as Acute. <b>0 Points</b>
<b>Total Checklist Points:</b>	<b>24 Points</b>	<b>34 Points</b>
<b>Recommended Monitoring Frequency (from Checklist):</b>	2 tests during permit term	1x yearly
<b>Limit Required?</b>	No	Yes Limit = 1.0 TU <sub>c</sub>
<b>TRE Recommended? (from Checklist)</b>	No	No

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above, two acute and annual 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).
- According to the requirements specified in s. NR 106.08, Wis. Adm. Code, a chronic WET limit is required. The chronic WET limit shall be expressed as 1.0 TU<sub>c</sub> as a monthly average in the effluent limits table of the permit.



Attachment #1

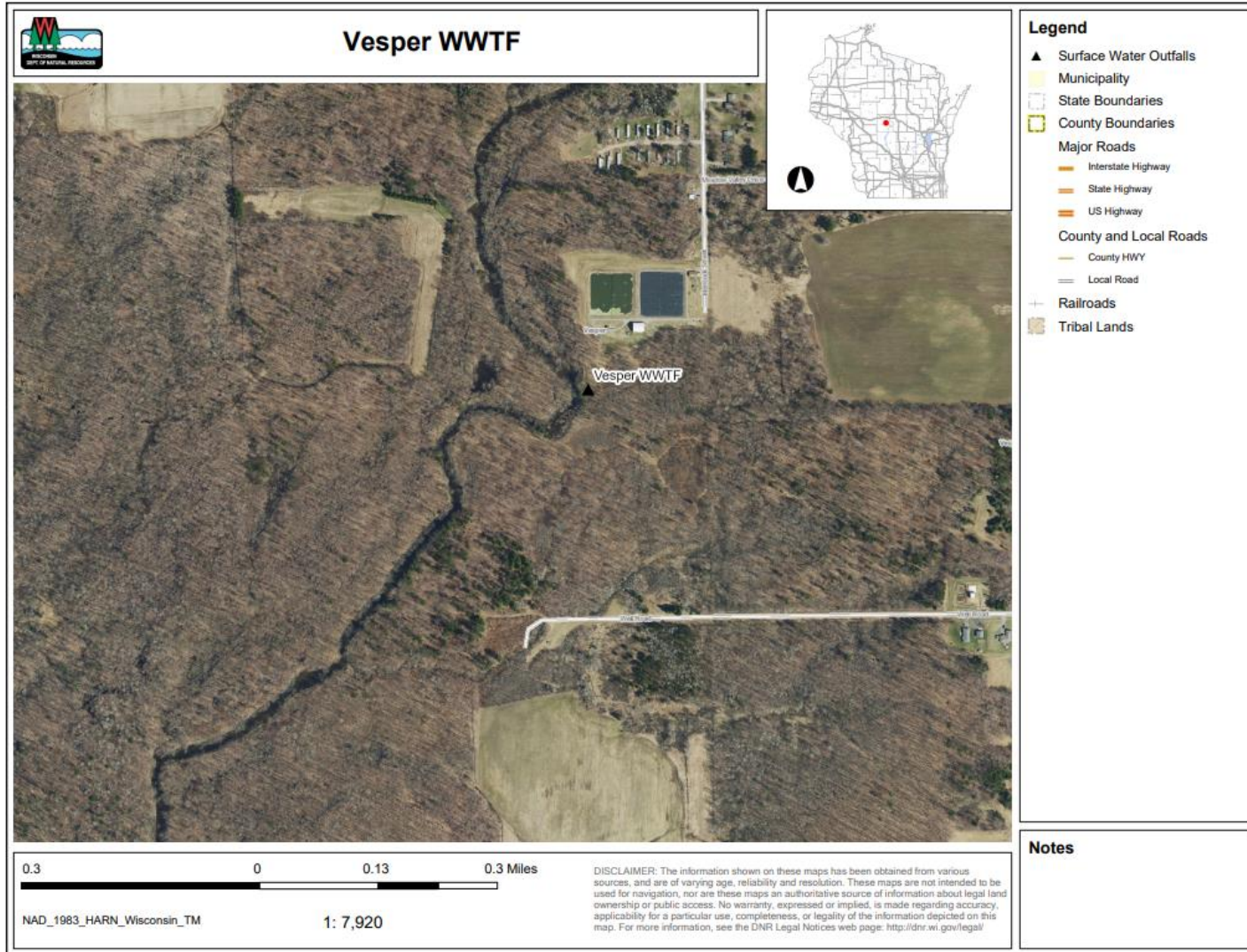
- A minimum of annual chronic monitoring is required because a chronic WET limit is required. Federal regulations in 40 CFR Part 122.44(i) require that monitoring occur at least once per year when a limit is present.

**Temperature limits for receiving waters with unidirectional flow**

(calculation using default ambient temperature data)

<b>Facility:</b>	Vesper WWTF	<b>7-Q<sub>10</sub>:</b>	0.008	cfs	<b>Temp Dates</b>		<b>Flow Dates</b>	
<b>Outfall(s):</b>	003	<b>Dilution:</b>	25%		<b>Start:</b>	01/01/21	10/01/18	
<b>Date Prepared:</b>	12/07/2023	<b>f:</b>	0		<b>End:</b>	12/31/21	10/31/23	
<b>Design Flow (Q<sub>e</sub>):</b>	0.103 MGD	<b>Stream type:</b>	Limited forage fish community					
<b>Storm Sewer Dist.</b>	0 ft	<b>Q<sub>s</sub>:Q<sub>e</sub> ratio:</b>	0.0	:1				
		<b>Calculation Needed?</b>	YES					

Month	Water Quality Criteria			Receiving Water Flow Rate (Q <sub>s</sub> ) (cfs)	Representative Highest Effluent Flow Rate (Q <sub>e</sub> )		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit	
	T <sub>a</sub> (default) (°F)	Sub-Lethal WQC (°F)	Acute WQC (°F)		7-day Rolling Average (Q <sub>esl</sub> ) (MGD)	Daily Maximum Flow Rate (Q <sub>ea</sub> ) (MGD)		Weekly Average (°F)	Daily Maximum (°F)	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	37	54	78	0.002	0.140	0.167	0	42	42	54	78
FEB	39	54	79	0.002	0.131	0.181	0	41	41	54	79
MAR	43	57	80	0.002	0.217	0.276	0	60	64	57	80
APR	50	63	81	0.002	0.267	0.442	0	56	56	63	81
MAY	59	70	84	0.002	0.164	0.243	0	69	69	70	84
JUN	64	77	85	0.002	0.157	0.243	0	71	75	77	85
JUL	69	81	86	0.002	0.182	0.492	0	72	73	81	86
AUG	68	79	86	0.002	0.229	0.281	0	72	73	79	86
SEP	63	73	85	0.002	0.199	0.257	0	65	68	73	85
OCT	55	63	83	0.002	0.256	0.387	0	64	64	63	83
NOV	46	54	80	0.002	0.147	0.343	0	48	51	54	80
DEC	40	54	79	0.002	0.161	0.311	0	44	46	54	79





**Notice:** Pursuant to ss. NR 106.59(4) and (6), Wis. Adm. Code, this application must be completed for dissipative cooling (DC) evaluation of a publicly operated treatment works (POTW) discharge as related to weekly average temperature limits. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law (ss. 19.31-19.39, Wis. Stats.).

**Facility Information**

Facility Name Vesper Wastewater Treatment Facility	Contact Name George Brandl
Telephone Number (715) 421-6369	Email Vesperww@gmail.com
This operation is (check one): <input type="radio"/> New or relocated outfall, or <input checked="" type="radio"/> Existing outfall	WPDES Permit No. WI-0030309-09-0

**Consultant Information (if consultant performed DC analysis)**

Company Name	Preparer Name		
Telephone Number	Email		
Mailing Address	City	State	ZIP Code

**DC Submittal Information**

This is a summary. Also see ch. NR 106.59, Wis. Adm. Code, and applicable Thermal Guidance. For each item, check the appropriate box. If information is attached, a column is provided for the applicant to write the page numbers where this information can be found.

Items REQUIRED to Include in the Submittal	Included?	Page Number (if applicable)
1. <b>Physical Description:</b> A written description of the physical characteristics of the receiving water or outfall. [s. NR 106.59(4)(a)(1) or 106.59(6)(a)(1), Wis. Adm. Code] <i>Note: It is recommended that a schematic drawing of location and outfall also be submitted.</i>	<input checked="" type="radio"/> Yes	
2. <b>Thermal Loading:</b> A written description of the presence or absence of other thermal loads or discharges of heated water to the receiving water in the vicinity of this outfall (upstream and downstream). [s. NR 106.59(4)(a)(2) or 106.59(6)(a)(2), Wis. Adm. Code]	<input checked="" type="radio"/> Yes	
3. <b>Temperature Data:</b> The minimum and maximum known effluent temperature for each calendar week for each previously permitted outfall over the past two years. [s. NR 106.59(4)(a)(3) or 106.59(6)(a)(3), Wis. Adm. Code] Must provide if available.	<input type="radio"/> Yes <input checked="" type="radio"/> Some data available, but not to full extent (explain) <input type="radio"/> Not available	See Page 2
4. <b>Site-Specific Conditions:</b> For more information on this section see s. NR 106.59(4)(b) or 106.59(6)(b), Wis. Adm. Code. Must provide if available. <i>Examples:</i> <i>Biological quality- Species composition, richness, diversity, density, distribution, age, presence/absence of threatened and endangered species, etc.</i> <i>Physical characteristics- Bottom substrate of surface water, physical configuration of outfall, discharge velocity, mixing zone, etc.</i>	<input checked="" type="radio"/> Yes <input type="checkbox"/> Biological quality <input type="checkbox"/> Physical characteristics <input checked="" type="checkbox"/> Min and max temperatures of the receiving water upstream of outfalls <input type="radio"/> Not available	See Page 2
Additional Items that <u>May Be</u> Included in the Submittal	Included?	Page Number (if applicable)
1. <b>Data Collection:</b> If temperature and/or plume data are not available, these data may need to be collected through a dye or temperature profile study. See Thermal Guidance document for additional information.	<input checked="" type="radio"/> Yes <input type="checkbox"/> Dye study <input checked="" type="checkbox"/> Temperature profile <input type="checkbox"/> Other <input type="radio"/> No	
2. <b>Visual/photographic information:</b> It is recommended that photographic or other visual documentation of the outfall and receiving water accompany any DC submittal.	<input checked="" type="radio"/> Yes <input type="radio"/> No	
3. <b>Other supporting information.</b>	<input type="radio"/> Yes <input checked="" type="radio"/> No	



# Dissipative Cooling Request

**Data Collection (if applicable)**

**Describe any studies performed to justify dissipative cooling.**

Type of study Temperature of the Effluent at the outfall, receiving water upstream and downstream	<input type="checkbox"/> Dye study <input checked="" type="checkbox"/> Temperature profile <input type="checkbox"/> Other
Time of Year: Month when study was performed October 02,06,09,13,16,20, and 23rd 2023.	<input type="checkbox"/> Jan <input type="checkbox"/> Apr <input type="checkbox"/> Jul <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Feb <input type="checkbox"/> May <input type="checkbox"/> Aug <input type="checkbox"/> Nov <input type="checkbox"/> Ma <input type="checkbox"/> Jun <input type="checkbox"/> Sep <input type="checkbox"/> Dec
Outfall flow conditions <i>at time of study</i> Normal flow conditions	<input type="checkbox"/> High <input checked="" type="checkbox"/> Average <input type="checkbox"/> Low
Waterbody flow conditions <i>at time of study</i>	<input type="radio"/> Yes <input type="radio"/> No

Written description of study results. Written description can also be attached.

	Upstream of Outfall	Effluent at outfall	100 feet downstream at riffle
10/02/2023	54.9 F	60.8 F	55.0 F
10/06/2023	55.6 F	61.1 F	55.6 F
10/09/2023	55.1 F	60.2 F	55.2 F
10/13/2023	54.2 F	59.8 F	54.1 F
10/16/2023	53.6 F	60.1 F	53.7 F
10/20/2023	53.7 F	60.3 F	53.8 F
10/23/2023	54.1 F	59.9 F	54.1 F

Temperature grab samples were taken at the same locations for the effluent at the outfall. The receiving water upstream and at the head of the riffle downstream, were sampled in the same locations marked by pink ribbon in overhanging branches.

**Justification for DC: Check ALL that apply.** Justification and rationale used to reach this justification should be included in the written description (included on next page or attached to this document), as required in ss. NR 106.59(4) or (6), Wis. Adm. Code.

*Physical Evidence of DC:*

- Non-unidirectional waters
  - Exit velocity such that rapid mixing of effluent occurs
  - Loss of heat to the atmosphere
  - Heat disperses rapidly and does not persist in water column at significant distances
  - Ambient temperature of waterbody does not increase greatly (less than or equal to 3°F) at a point more than a few hundred feet from the outfall
- Unidirectional waters
  - Exit velocity such that rapid mixing of effluent occurs
  - Rough bottom substrates present resulting in turbulent flow
  - Loss of heat to the atmosphere
  - Thermal mixing zone does not extend more than 25% of the cross-sectional area or more than 50% of the width of the receiving stream
  - Zone(s) of free passage exist for fish and aquatic life
  - Ambient temperature of waterbody does not increase greatly (less than or equal to 5°F) at a point more than 5 to 10 stream widths downstream of outfall

*Biological Evidence of DC:*

- Discharge does not impede migration of organisms
- No observed difference between communities in and outside of discharge
- No presence of threatened or endangered organisms

*Other Information:*

- Multiple thermal effluent discharges do not exist
- Other

Written Description as required in s. NR 106.59(4) or (6), Wis. Adm. Code: All required written descriptions as well as justification for dissipative cooling should be included. See table on page 1, administrative code, and/or applicable Thermal Guidance for more information. Written description and justification may also be attached.

## Physical Description of Receiving Water + Outfall

Outfall is a 10 inch PVC pipe that discharges just past the bank of Hemlock Creek. There is large breaker rock to help with Mixing. The receiving water is a typical Stream/Creek with Moderate flow. Pictures of outfall and receiving water was sent to Logan Rubeck via text.

## Thermal Loading:

There is no Thermal Loading from the Dam located approx. .25 Miles North of EFF discharge. There is no thermal loading <sup>upstream</sup> downstream (South) of EFF discharge that is known.

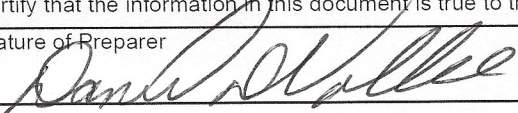
EFF Channel temps were sent via email to Logan Rubeck from 11/2022 thru 10/2023. Grab samples are taken from Composite Sampler. Samples are Measured in C° with D.O. Probe. Random checks are made with a calibrated thermometer.

Additional information can be found in the Rule Order on the Thermal Standards, the Guidance for Implementation of Wisconsin's Thermal Water Quality Standards, and the frequently asked questions page. These resources are available at: <http://dnr.wi.gov/org/water/wm/wqs/thermalrulesrevisions.htm>.

### The Preparer and the Owner Certify the Following:

- I am familiar with the specifications submitted for this application, and I believe all applicable items in this checklist have been addressed.
- I have completed this document to the best of my knowledge and have not excluded pertinent information.
- I certify that the information in this document is true to the best of my knowledge.

Signature of Preparer




Date Signed


11-29-23








Map

**Legend** 

 50 ft

**Parcels** 

**Sewer Manholes** 

**Sewer Lines** 

Google



1+00 305 L.F. - 10" PVC OUTFALL PIPE 2+00 3+00

15 L.F. 10" DUCTILE IRON

SILT FENCE

18" MIN ROCK RIP-RAP WITH GEOTEXTILE FABRIC

PISTA  
MH-2 OUTFALL MANHOLE, TYPE 1  
STA. 3+68.0' R.I.

EROSION MAT, AS REQ'D COORDINATE, WITH RFR

STONE WEEPER

EOP STA = 5+21.3095

AGGREGATE CONTROL STRUCTURE

HIGH, POST AERATION CHANNEL

EXISTING GRADE OVER OUTFALL PIPE

304 LI - 10" PVC OUTFALL PIPE @ 0.00%

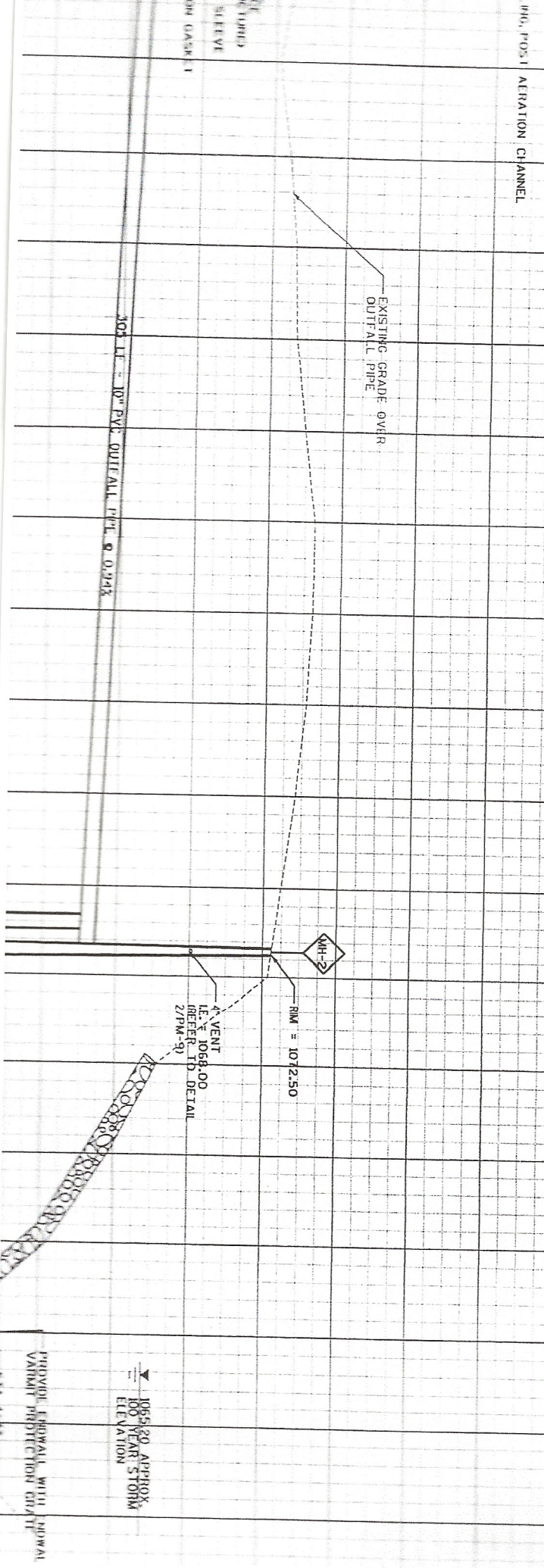
4" VENT  
I.E. 1068.00  
REFER TO DETAIL  
Z/PM-90

RIM = 1072.50

1065.30 APPROX  
100 YEAR STORM  
ELEVATION

PROVIDE EROSION MAT WITH STORM  
WARRANT PROTECTION GRADE

10 SLEEVE  
HIGH CASE





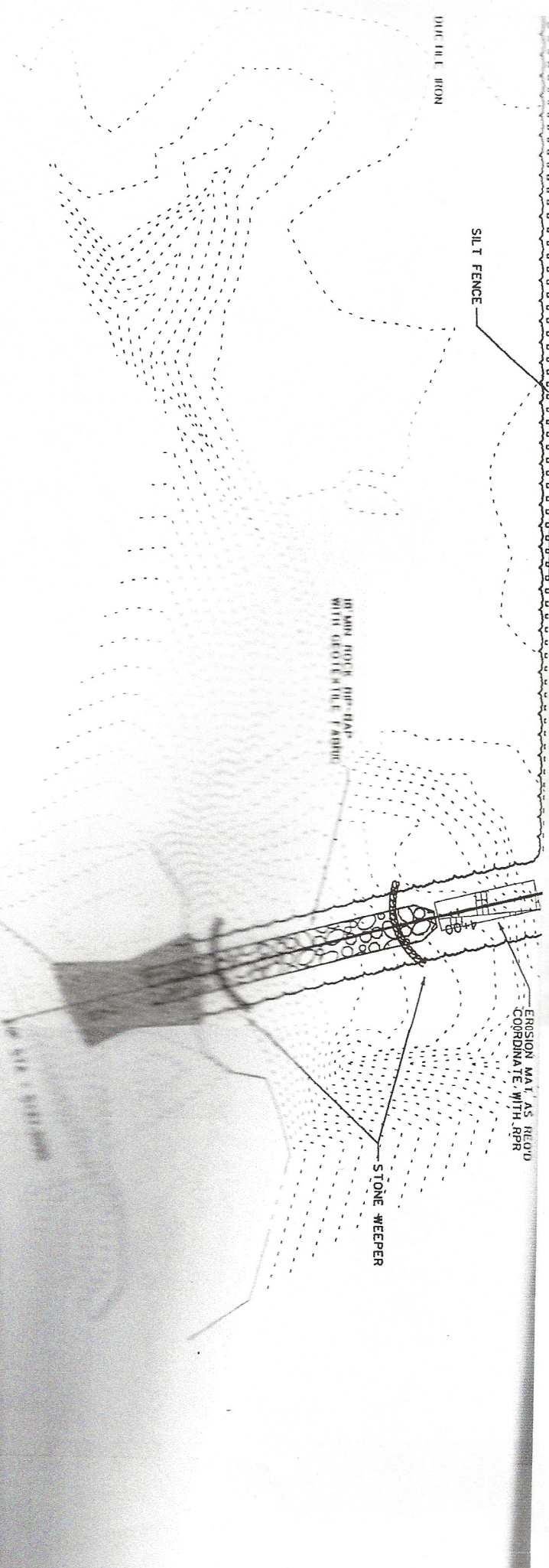
DATE: 11.1.2010

SILT FENCE

10 MIN HOLES HO-HAP WITH GEOTEXTILE FABRIC

EROSION MAT. AS REQ'D COORDINATE WITH RPR

STONE #KEEPER



CHANNEL

EXISTING-GRADE OVER OUTFALL PIPE

302 LT - 10" PVC OUTFALL PIPE @ 0.94%

OUTSIDE DITCH CONCRETE ENCASED

MH-2

RIM = 1072.50

4" VENT L.E. = 1068.00 (REFER TO DETAIL 27/PM-9)

102 LT - 10" PVC OUTFALL PIPE @ 0.12%

142 LT - 10" PVC OUTFALL PIPE @ 0.12%

PROVIDE ENDWALL WITH ENDWALL AND VENT PROTECTION GRATE

STA. 4+77 L.E. = 1055.10

1055.20 APPROX. 100 YEAR STORM ELEVATION

1052 1056 1060 1064 1068 1072 1076 1080 1084 1088 1092 1096 1100



6-23

Date	Analys
1	
2	
3	
4	
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28	
29	
30	
31	

O	EFF Temp
4	15.31
4	16.78
7	15.91
8	15.80
6	19.12
7	20.78
3	22.42
8	22.58
5	22.44

10-23

Date	A	EFF Temp
1		
2	6	- 18.88
3		
4		
5		
6	6	- 18.27
7		
8		
9		- 16.16
10		
11		
12		
13		- 15.81
14		
15		
16		- 14.45
17		
18		
19		
20	8	- 11.54
21		
22		
23		- 13.20
24		
25		
26		
27		- 12.97
28		
29		
30		12.97

9-23  
~~9-23~~  
~~9-23~~

Date	Analyst
1	
2	
3	
4	
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6	
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8	
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11	
12	
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27	
28	
29	
30	
31	

	EFF Temp
2	- 21.03
	- 23.62
3	- 20.02
1	- 20.75
8	18.19
	- 18.16
5	- 20.71
	- 18.38
	-
	- 18.10

8-23

Date	Analyst
1	
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27	
28	
29	
30	
31	

O	EFF Temp
	6 - 24.57
	0 - 23.36
	1 - 23.56
	5 - 21.98
	7 - 20.25
	- 23.12
	9 - 24.18
	15 - 22.08

7-23

Date	Analy
1	
2	
3	
4	
5	
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27	
28	
29	
30	
31	

DO	EFF Temp
2	21.25
9	21.81
4	22.69
7	22.48
3	21.75
4	21.85
1	22.18
	23.30
8	22.98









3-23

Date	Analyst
1	
2	
3	
4	
5	
6	
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11	
12	
13	
14	
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28	
29	
30	
31	

0	EFF Temp
8	5.68
1	5.79
10	6.09
2	5.50
5	6.25
2	9.68
7	8.22
7	9.60
	11.04



1-23

Date	Analy
1	
2	
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29	
30	
31	

DO	EFF Temp
43	7.01
3	10.01
58	7.11
11	6.83
05	6.64
50	6.41
44	5.87
21	6.79
49	4.80

12-22

Date	Anal
1	
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30	
31	

DO	EFF Temp
58	6.79
70	6.44
75	5.96
14	6.76
8	6.52
2	5.89
1	4.40
2	7.63
3	7.42

11-22

Date	Analys
1	
2	
3	
4	
5	
6	
7	
8	
9	
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12	
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28	
29	
30	
31	

EFF Temp
1 - 10.71
6 - 11.72
05 - 12.30
0 - 11.53
1 - 7.70
*
71 - 11.01
45 - 7.20
5 - 6.88







**Notice:** This checklist is meant to be a tool to help Water Quality-Based Effluent Limitation (WQBEL) calculators analyze dissipative cooling (DC) requests made by publicly operated treatment works (POTWs) under ss. NR 106.59(4) or (6), Wis. Adm. Code. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law (ss. 19.31-19.39, Wis. Stats.).

**Facility Information**

Permittee Name Village of Vesper	This DC evaluation is (check one): <input type="radio"/> Original DC Proposal or <input checked="" type="radio"/> Updated DC Proposal
This operation is (check one): <input type="radio"/> New or relocated outfall, or <input checked="" type="radio"/> Existing outfall	WPDES Permit No. WI-0030309

**Submitted Information**

**Physical Characteristics:**

Type of Receiving Water	<input type="radio"/> Non-unidirectional water <input checked="" type="radio"/> Unidirectional water	Comments
Waterbody Type	<input type="radio"/> Cold water fishery <input type="radio"/> Warm water sport fishery <input type="radio"/> Warm water forage fishery <input type="radio"/> Limited aquatic life <input type="radio"/> Wetland <input checked="" type="radio"/> Other _____	Comments Limited Forage Fishery
Substrate	<input checked="" type="radio"/> Rocky <input type="radio"/> Gravel <input type="radio"/> Sand <input type="radio"/> Silt <input type="radio"/> Unknown <input type="radio"/> Other _____	Comments
Emergent Features	<input checked="" type="radio"/> Rocks <input type="radio"/> RipRap <input type="radio"/> Structure <input type="radio"/> None <input type="radio"/> Other _____	Comments
Ambient Temperature Data	<input checked="" type="radio"/> Available <input type="radio"/> Not available	Comments

**Operation Characteristics:**

Multiple Discharges	<input type="radio"/> There are multiple discharges that may contribute thermal loads <input checked="" type="radio"/> There are NOT multiple discharges	Comments
Availability of Effluent Temperature Data	<input checked="" type="radio"/> Available <input type="radio"/> Month(s) only (explain) _____ <input checked="" type="radio"/> 12 months of representative data (as defined in NR 106.59(4 or 6) (3) <input type="radio"/> Not Available	Comments
Temperature Profile of Thermal Plume	<input type="radio"/> Data available <input checked="" type="radio"/> Zone of free passage identified <input type="radio"/> Zones of free passage present <input type="radio"/> Zones of free passage absent <input type="radio"/> No data available	Comments Zone of free passage at outfall identified in previous evaluation. Plume well mixed 100 ft downstream of outfall, with stream temperature returned to near ambient conditions (+0.2 F).
Mixing Zone Characteristics	<input type="radio"/> Visual/photographic information <input type="radio"/> Dye study <input type="radio"/> No data available	Comments Conductivity measurements of plume.



# Dissipative Cooling Evaluation Checklist

Form 3400-199 (R 10/13)

Page 2 of 3

**Biological Characteristics:**

Discharge Impacts on Migration of Organisms	<input type="radio"/> Impeded <input type="radio"/> Not impeded <input checked="" type="radio"/> Unknown	Comments
Difference Between Communities in and Outside of Discharge	<input type="radio"/> Observed <input type="radio"/> Not observed <input checked="" type="radio"/> Unknown	Comments
Threatened or Endangered Organisms	<input type="radio"/> Present; information source? <input checked="" type="radio"/> Not present; information source? <input type="radio"/> Unknown	Comments No aquatic E&T species per Natural Heritage Inventory.

**Department Determination:**

**Water Quality Biologist**

The water quality biologist concludes the following about the DC study:	<input type="radio"/> Heated effluent from the discharge is not having an impact on the fish and aquatic life in the receiving water  <input type="radio"/> Heated effluent from the discharge may have a marginal impact but does not pose an overall concern to the fish and aquatic life community in the receiving water  <input type="radio"/> Heated effluent from the discharge may cause an impact on the fish and aquatic life in the receiving water and poses a concern to the aquatic life community in the receiving water  <input type="radio"/> Heated effluent from the discharge is causing an impact on the fish and aquatic life in the receiving water  <input type="radio"/> Unsure  <input checked="" type="radio"/> Water quality biologist not consulted	Comments <i>(include name of DNR staff participants)</i>
Was the regional fisheries biologist consulted by the water quality biologist when making this recommendation?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Comments <i>(include name of DNR staff participants)</i>

**Additional Support:**

Does regional staff or basin engineer support physical evidence of DC?	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> Not Obtained <i>If contacted, please attach written response from basin engineer.</i>	Comments <i>(include name of DNR staff participants)</i>
Did preparer or other DNR staff visit the site or is such person(s) familiar with the site so as to verify and substantiate the information in the submittal?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Comments <i>(include name of DNR staff participants)</i> Site was visited on 8/23/2017 by Pat Oldenburg. See Vesper Dissipative Cooling Site Visit memo dated 8/30/2017.

Additional written documentation provided?

- Yes (if yes, written document should be attached)  
 No

# Dissipative Cooling Evaluation Checklist

Form 3400-199 (R 10/13)

Page 3 of 3

## DC Conclusion

Based on the available information, dissipative cooling for this operation is (check one):

- Approved
- Not enough evidence
- Not approved

Additional Justification (if needed)

Updated receiving water and effluent temperature data taken in October 2023 was submitted with the Dissipated Cooling Request that supports the original approval.

Preparer Name

Benjamin Hartenbower, PE

Job Title

Water Resources Engineer

Signature of Preparer



Date Signed

12-21-23

*A copy of this completed form should be saved in SWAMP, and a notification of the final determination should be sent to the Thermal Implementation Coordinator.*

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

Permittee Name

Village of Vesper

WPDES Permit Number <b>WI- 0   0   3   0   3   0   9</b>	County <b>Wood</b>
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1. Did the point source apply for the MDV at the appropriate time?	<input checked="" type="radio"/> Yes <input type="radio"/> No. <i>STOP- facility not eligible at this time.</i>	See Questions 1-3.
2. This operation is (check one):	<input type="radio"/> New or relocated outfall. <i>STOP- facility not eligible.</i> <input checked="" type="radio"/> Existing outfall	See Questions 5-6.
3. Is the point source is located in an MDV eligible area?	<input checked="" type="radio"/> Yes <input type="radio"/> No. <i>STOP- facility not eligible.</i>	Apply County information to Appendix H. Additional information provided in Q7 on municipal form & Q7-8 on industrial form.
4. The secondary indicator score for the county (counties) the discharge is located is:	<u>6</u>	See Appendices A-F. If the score is less than 2, stop; the facility is not eligible. See Q23 on municipal form & Q28 on industrial form.
5. Is a major facility upgrade required to comply with phosphorus limits?	<input checked="" type="radio"/> Yes <input type="radio"/> No. <i>STOP- facility not eligible.</i>	See Q8 on municipal form/Q9 on industrial form.
6. List the months where phosphorus limits cannot be achieved during the permit term:	<input checked="" type="checkbox"/> All <input checked="" type="checkbox"/> Jan <input checked="" type="checkbox"/> Apr <input checked="" type="checkbox"/> Jul <input checked="" type="checkbox"/> Oct <input checked="" type="checkbox"/> Feb <input checked="" type="checkbox"/> May <input checked="" type="checkbox"/> Aug <input checked="" type="checkbox"/> Nov <input checked="" type="checkbox"/> Mar <input checked="" type="checkbox"/> Jun <input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Dec	Consider checking with limit calculator. If this does not match information in application, the application should be updated prior to approval.

7. What is the current effluent level achievable?				
Outfall Number(s) 003	Conc. (mg/L) 0.71	Method for calculation: <input checked="" type="radio"/> 30-day P99 <input type="radio"/> Other, specify:	Does this concur with application? <input type="radio"/> Yes <input checked="" type="radio"/> No, why not: <b>application used different dataset</b>	DNR staff should verify the effluent concentration value(s) provided. See Q11 on municipal form & Q12 on industrial form.

8. What is the appropriate interim limitation(s) for the permit term?  
 0.4 mg/L as a monthly average, consistent with s. 283.16 (7), Wis. Stats. Target value = 0.2 mg/L.

Provide Rationale:

The 30-day p99 value from the past three years' worth of data is 0.71 mg/L. However, vesper has achieved much lower phosphorus effluent concentrations recently. A schedule may be warranted to address issues causing treatment variability. The WQBEL memo may recommend an interim limit that differs from the value recommended above.

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

<p>9. <i>For Industries Only-</i> Where does the phosphorus in the effluent come from? (check all that apply)</p>	<p><input type="checkbox"/> Process  <input type="checkbox"/> Additive Usage  <input type="checkbox"/> Water supply</p> <p><i>Can intake credits be given or can the facility use an alternative water supply?</i></p> <p><input type="radio"/> Not feasible  <input type="radio"/> Possibly, but further analysis needed  <input type="radio"/> Not evaluated at this time</p>	<p><i>See Q14-15 &amp; 19 on industrial form. If the answer is "possibly" or "not evaluated", the schedule section of the MDV permit should contain a requirement to perform this analysis.</i></p>
<p>10. Has this facility optimized?</p>	<p><input checked="" type="radio"/> Yes  <input type="radio"/> In progress  <input type="radio"/> No</p>	<p><i>See Q14 on municipal form &amp; Q16 &amp; 20 on industrial form. Facility must optimize and operate at an optimize treatment level (s. 283.16(6)(a), Wis. Stat.)If no will need compliance schedule.</i></p>
<p>11. Has a facility plan/compliance alternative plan been completed for the facility?</p>	<p><input checked="" type="radio"/> Yes  <input type="radio"/> In progress  <input type="radio"/> No</p>	<p><i>See Q15 on municipal form &amp; Q17 on industrial form.</i></p>
<p>12. What is the projected cost for complying with phosphorus?</p> <p style="text-align: right;">Source:</p>	<p>\$ <u>2,256,200.00</u></p> <p><u>2018 assessment</u></p>	<p><i>Facility must submit site-specific compliance costs. If cost projections are used from EIA, the permittee must certify that these costs are reasonable for the facility in question. See "projected compliance costs" in Section 2.02 of the MDV Implementation Guidance for details.</i></p>

Comments on planning efforts:

The Village of Vesper submitted a final compliance alternatives plan in September 2016. The final compliance alternatives plan evaluated alternate discharge locations and watershed approaches. It was determined that going to a groundwater discharge was not feasible as the surrounding soil is not suitable. Neither AM/WQT was determined as feasible due to a lack of projects for the facility. Tertiary treatment available in 2016 has not advanced significantly or grown more affordable, so the 2016 evaluation is likely accurate in 2023.

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

Comments on economic demonstration:

Within the final compliance alternatives plan dated September 2016, site-specific estimates for treatment alternatives were provided. Based on a supplementary march 2018 analysis, a lagoon system upgrade to include cloth disc filters results in capital costs of \$2,256,200. This approach represents the lowest cost option for meeting the 0.075 mg/L WQBEL.

Current user rates average \$385.90. Using the 2023 MHI (\$55,000) and lower residential portion (53%) result in an average user rate increase to \$861.81 or 1.55% of MHI.

Wood County's secondary indicator score of 6 requires the primary screener of rate increases to > 1 % of MHI. The lowest cost treatment option has been shown to increase user rates to 1.55%, meeting the primary screener.

15. What watershed option was selected?

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

**Section 4. Watershed Plan Review**

16. MDV Plan Number:

*Note: This is for tracking purposes. Contact Statewide Phosphorus Implementation Coordinator for the plan number.*

\_\_\_\_\_

17. Did the point source complete Form 3200-148?

- Yes
- No

18. Is the project area in the same HUC 8 watershed as the point of discharge?

- Yes
- No. *STOP- Watershed plan must be updated.*

19. What is the annual offset required?

*See Section 2.03 of the MDV implementation guidance. If this value is different from the offset target provided in form 3200-148, the watershed plan should be amended.*

\_\_\_\_\_

20. Does the plan ensure that the annual load is offset annually?

- Yes
- No. *STOP- Watershed plan must be updated.*

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

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

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

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

23. Do you have any concerns about the watershed project?

*Note: Coordinate with other DNR staff as appropriate.*

- Yes. *STOP- Watershed plan must be updated.*
- No.

Comments:

**Section 5. Payment to the County(ies)**

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

\$ 62.65

See "Payment Calculator" document at

[\\central\water\WQWT\\_PROJECTS\WY\\_CW\\_Phosphorus\MDV.](#)

**Section 6. Determination**

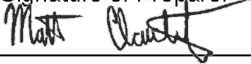
Based on the available information, the MDV application is:

- Approved
- Request for more information
- Denied

Save



Additional Justification (if needed):

Certification	
Preparer Name Matt Claucherty	Title Water Resources Management Specialist
Signature of Preparer 	Date 6/16/2023

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

[Submit to Coordinator...](#)



6/16/2023

Daniel Vollert, Village President  
PO Box 127  
Vesper, WI 54489

Subject: Conditional approval of a multi-discharger phosphorus variance  
Receiving Stream: Hemlock Creek in Wood County  
Permittee: Village of Vesper, WPDES WI-0030309

Dear Mr. Vollert:

In accordance with s. 283.16 of the Wisconsin Statutes, you have requested coverage under Wisconsin's multi-discharger phosphorus variance for the Vesper Wastewater Treatment Facility in an application dated 3/29/2023. Wisconsin's multi-discharger phosphorus variance was approved by EPA on February 6, 2017. Coverage under the multi-discharger phosphorus variance may only be granted to an existing source that demonstrates a major facility upgrade is necessary to achieve phosphorus compliance and the upgrade will result in economic hardship as defined in the federally approved variance. The water quality criterion for which you are seeking a variance is contained in s. NR 102.06, Wis. Adm. Code.

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

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

Sincerely,

Matt Claucherty, MDV Point Source Coordinator  
Bureau of Water Quality

e-cc Peter Petersen, Village of Vesper  
Holly Heldstab, WDNR  
Geisa Thielen, WDNR  
Tim Elkins, EPA Region 5  
Micah Bennett, EPA Region 5