Permit Modification Fact Sheet

Changes from the previous permit fact sheet are highlighted in grey.

General Information

Permit Number:	WI-0021920-11-1	
Permittee Name:	Viroqua, City of	
Address:	City Hall 124 W Decker St	
City/State/Zip:	Viroqua WI 54665	
Discharge Location:	Viroqua Wastewater Treatment Facility, 1315 CTH B, Viroqua, WI	
Discharge Type:	Existing, Surface Water Discharge	
Receiving Water:	unnamed tributary to the Springville Branch of the Bad Axe River, in the Bad Axe River Watershed of the Bad Axe / La Crosse Rivers Basin located in Vernon County	
StreamFlow ($Q_{7,10}$):	0.93 cfs	
Stream Classification:	Limited Aquatic Life Community, Non-public Water Supply, approximately 1,500 ft upstream of where the classification changes to a Class 1 Trout stream.	
Design Flow(s)	Annual Average	0.535 MGD
Significant Industrial Loading?	No; however, industrial wastewater is accepted from the following categorial and noncategorical industrial facilities: Nelson Global Products – fabricators, LuSa Organics - Small personal care product & soap making business, Vernon County Highway Department - Truck Wash, Kwik Trip Car Wash - Car Wash Facility, Mobile Car Wash - Car Wash Facility, Vernon County Landfill Leachate	
Operator at Proper Grade?	Yes Advanced Level in each of the following subclasses: A1 – Suspended Growth Processes; B Solids Separation; C – Biological Solids/Sludge Handling, Processing, and Reuse; D – Disinfection; P – Total Phosphorus; and SS – Sanitary Sewage Collection System. Subclass SS is a Basic Level subclass only. The permittee shall have at least one person obtain certification for Subclass SS before the end of the permit term.	
Approved Pretreatment Program?	N/A	

Facility Description

The City of Viroqua owns and operates an activated sludge type wastewater treatment facility and has an annual average design flow of 0.535 MGD. The facility had an actual annual average flow in 2022 of 0.278 MGD. The facility discharges to the unnamed tributary of the Springville Branch of the Bad Axe River. Wastewater treatment includes fine screening, primary clarification, conventional activated sludge process, biological phosphorus removal, and ultraviolet disinfection prior to discharge out Outfall 005. During high flow events, any flow greater than 2 MGD is discharged out the old Outfall 001. An equalization (EQ) pond is used to store influent flow during wet weather events, and if needed excess flow is pumped from the EQ pond, around secondary biological treatment, and rejoins treated flow prior to seasonal UV disinfection. This flow is regulated as "blending" under s. NR 210.12, Wis. Adm. Code. Sludge from primary and secondary clarifiers are sent to a Dissolved Air Flotation unit (DAF) for sludge thickening and anaerobic digestion, and UV disinfection prior to being land applied on approved agricultural fields. The permittee has requested blending approval to continue as part of their permit application. Based on an evaluation of their request and associated

documentation, blending is approved per s. NR 210.12(2), Wis. Adm. Code. In addition, the permittee has re-applied for a dissipative cooling evaluation regarding temperature effluent requirements which was approved per ss NR 106.59 Wis. Adm. Code. Operational changes since the last permit issuance include added sludge thickening, improved operational flexibility and upgrades to the clarifier, and upgrades to the hauled waste facilities. Major monitoring changes include 1) adding an in-plant sample point 104 to monitor blending occurrences, 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) changing effluent phosphorus compliance from a multi-discharger variance to a water quality trading plan which uses DNR approved projects to mitigate phosphorus discharges to the watershed, 5) water quality trading associated compliance schedules, and 6) new PFOS/PFOA monitoring and associated compliance schedule.

Substantial Compliance Determination

Enforcement During Last Permit: Several notices of noncompliance (NONs) were sent in response to sanitary sewer overflows. Corrective actions include an aggressive sewer cleaning regime, continual inspection, televising and smoke testing. Long term actions include, continuing to identify I&I in the system, replacing aged sewer, lining sewer mains, implementing a clear water inspection program and rehabilitating manholes.

After a desk top review of all: discharge monitoring reports, CMARs, land app reports, compliance schedule items, and a site visit on 03/24/2022, this facility has been found to be in substantial compliance with their current permit. – Julia Stephenson

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)**
701	0.278 MGD (2022)	INFLUENT: 24-hr Flow Proportional Composite samples shall be collected right after the Huber fine screen and prior to the influent parshall flume.
104	No blending has occurred last permit term.	BLENDING: Sample point for reporting diverted flow from the equalization pond during high flow events. Wastewater flow bypasses the aeration basins and final clarifiers and then receives disinfection prior to discharge. The permittee shall notify the Department when blending occurs. See "Blending" requirements in the Standard Requirements section of the permit.
001	No discharge has occurred last permit term.	EMERGENCY AND HIGH FLOW EFFLUENT: Sample Point for reporting emergency or high flow effluent that is unable to be discharged out the main Outfall 005. Any effluent flows exceeding 2 MGD crest the weir located in the metering manhole and are discharged out Outfall 001. If, in an emergency Outfall 005 is blocked, Outfall 001 may be used for discharge. Both composite and grab sampling locations are the same as for Outfall 005. Daily sampling shall occur when outfall is in use. Discharge is to the unnamed tributary immediately adjacent to the wastewater treatment plant.
005	0.216 MGD (2022)	EFFLUENT: 24-hr Flow Proportional Composite samples shall be collected before the UV treatment and include all blended flow. Grab samples shall be collected directly after the UV treatment in the metering manhole. Discharge is

Sample Point Designation		
Sample Point Number	**Discharge Flow, Units, and Averaging Period**	**Sample Point Location, WasteType/sample Contents and Treatment Description (as applicable)**
		upstream of the box culvert at the intersection of CTH B and Springville Rd.
002	71 Metric Tons (2022)	LIQUID SLUDGE: Class B, anaerobically digested and thickened sludge samples shall be collected from the holding tank mixer sample tap.

1 Influent - Monitoring

Sample Point Number: 701- AFTER SCREEN, PRIOR TO FLUME

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD5, Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	

Changes from Previous Permit:

None

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 Inplant - Monitoring and Limitations

Sample Point Number: 104- BLENDING

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Per Occurrence	Continuous	See "Blending Flow" subsection below.
Time		hours	Per Occurrence	Calculated	Report the total duration of blending within a given day (12:00am - 11:59pm) in which

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					blending occurs. See "Blending Flow" subsection below.

Changes from Previous Permit:

New sample point to monitoring blending occurrences.

Explanation of Limits and Monitoring Requirements

The permittee has requested blending approval to continue as part of their permit application. Based on an evaluation of their request and associated documentation, blending is approved per s. NR 210.12(2), Wis. Adm. Code. Standard monitoring parameters for blending practices are included in the permit.

3 Surface Water - Monitoring and Limitations

Sample Point Number: 001- EMERGENCY/HIGH FLOW

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Calculated	
BOD5, Total	Monthly Avg	20 mg/L	Daily	24-Hr Flow Prop Comp	
BOD5, Total	Weekly Avg	30 mg/L	Daily	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	20 mg/L	Daily	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	30 mg/L	Daily	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	0.8 mg/L	Daily	24-Hr Flow Prop Comp	Effective upon reissuance and this limit will be retained beyond the effective date of the final limits as it represents a minimum control level. See "Water Quality Trading (WQT)" sections for more information.
Phosphorus, Total		lbs/day	Daily	Calculated	Report daily mass discharged using Equation 1a. in the "Water Quality Trading (WQT)" section.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
WQT Credits Used (TP)		lbs/month	Monthly	Calculated	Report WQT TP Credits used per month using Equation 2b. in the "Water Quality Trading (WQT)" section. Available TP Credits are specified in Table 2 and in the approved Water Quality Trading Plan.
WQT Computed Compliance (TP)	6-Month Avg	0.14 mg/L	Monthly	Calculated	Value entered on the last day of the month. Value entered at the end of the six-month period (June 30 and December 31).
WQT Computed Compliance (TP)	Monthly Avg	0.42 mg/L	Monthly	Calculated	Report the WQT TP Computed Compliance value using Equation 3a. in the "Water Quality Trading (WQT)" section. Value entered on the last day of the month.
WQT Computed Compliance (TP)	6-Month Avg	0.64 lbs/day	Monthly	Calculated	Report the WQT TP Computed Compliance value using Equation 3b. in the "Water Quality Trading (WQT)" section. Value entered on the last day June and December.
WQT Credits Used (TP)	Annual Total	149.4 lbs/yr	Annual	Total Annual	The sum of total monthly credits used may not exceed Table 2 values listed below.
pH Field	Daily Max	9.0 su	Daily	Grab	
pH Field	Daily Min	6.0 su	Daily	Grab	
Dissolved Oxygen	Daily Min	4.0 mg/L	Daily	Grab	
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	5.8 mg/L	Daily	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	14 mg/L	Daily	24-Hr Flow Prop Comp	
E. coli	Geometric Mean - Monthly	126 #/100 ml	Daily	Grab	Limit and monitoring apply May-Sept. See E. coli section below.

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit and monitoring apply May-Sept. See E. coli section below.

Changes from Previous Permit

Changes include replacing seasonal fecal coliform limits with *E. coli* limits and changing effluent phosphorus compliance from a multi-discharger variance to a water quality trading plan which uses DNR approved projects to mitigate phosphorus discharges to the watershed. In addition, monitoring for parameters without limits have been discontinued since this sample point is only used for emergency/high flow events, and all other monitoring parameters will be included in sample point 005 which is the typically used outfall for this facility. Some sampling frequencies have changed to 'Daily' to better capture times of active discharge which are unpredictable.

Explanation of Limits and Monitoring Requirements

Water Quality Based Limits and WET Requirements and Disinfection (if applicable)

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated April 3, 2023 used for this reissuance, in addition to the conditional WQT approval dated June 5, 2023.

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.

BOD, TSS, DO and pH

Monitoring and limits for these pollutants 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.

E. Coli

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.

Phosphorus

Phosphorus requirements are based on the Phosphorus Rules that became effective December 1, 2010 as detailed in NR 102 Water Quality Standards and NR 217 Effluent Standards and Limitations for Phosphorus. Chapter NR 217 of the Wis. Adm. Code addresses point source dischargers of phosphorus to surface waters. Currently in NR 217 Wis. Adm. Code there are two methods used to determine if a phosphorus limit is needed: a technology based effluent limit (TBEL) and a water quality based effluent limit (WQBEL). Based on the size and classification of the stream, the water quality criteria for the Springville Branch of the Bad Axe River is 0.075 mg/L. In this case, *the WQBEL is 0.42 mg/L (monthly average), 0.14 mg/L & 0.64 lbs/day (6-month average).* For the reasons explained in the April 30, 2012 paper entitled 'Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for

Phosphorus Discharges in Wisconsin', WDNR has determined that it is impracticable to express the phosphorus WQBEL for the permittee as a maximum daily, weekly or monthly value. The final effluent limit for phosphorus is expressed as a six-month average. It is also expressed as a monthly average equal to three times the derived WQBEL (which equates to 0.3 mg/L). This final effluent limit was derived from and complies with the applicable water quality criterion. A phosphorus concentration limit is necessary to prevent backsliding during the term of the permit. The current MDV interim limit of 0.8 mg/L will be retained as a limit in the permit going forward as the minimum control level (MCL). An MDV county payment schedule item is included to cover MDV payments that accrued during the previous permit term (1/1/2023 – 9/30/2023).

The wastewater treatment facility is not able to meet the WQBEL with current treatment technology. This permit authorizes the use of trading as a tool to demonstrate compliance with the phosphorus WQBELs. This permit includes terms and conditions related to the Water Quality Trading Plan (WQT-2023-0003) or approved amendments thereof. The total 'WQT TP Credits' available are designated in the approved WQT Plan. The City is implementing streambank stabilization projects where the WQT plan proposes a total of 149.4 lbs/year of phosphorus credits for the next five years.

Additional WQT subsections in the permit provide information on compliance determinations, annual reporting and re-opening of the 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.

There is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits. However, the permit currently has weekly and monthly limits throughout the year. Where there are existing ammonia nitrogen limits in the permit, the limits must be retained regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:

> (b) If a permittee is subject to an ammonia limitation in an existing permit, the limitation shall be included in any reissued permit. Ammonia limitations shall be included in the permit if the permitted facility will be providing treatment for ammonia discharges.

In summary, after rounding to two significant figures, the 14 mg/L weekly average and 5.8 mg/L monthly average ammonia nitrogen limitations will continue for this permit reissuance. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.

Sample Point Number: 005- RELOCATED OUTFALL TO TRIB

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Continuous	Continuous	
BOD5, Total	Monthly Avg	15 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Weekly Avg	15 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD5, Total	Weekly Avg	66 lbs/day	3/Week	Calculated	
Suspended Solids, Total	Monthly Avg	15 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	15 mg/L	3/Week	24-Hr Flow Prop Comp	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
pH Field	Daily Max	9.0 su	Daily	Grab	
pH Field	Daily Min	6.0 su	Daily	Grab	
Dissolved Oxygen	Daily Min	4.0 mg/L	Daily	Grab	
Nitrogen, Ammonia (NH3-N) Total	Monthly Avg	5.8 mg/L	3/Week	24-Hr Flow Prop Comp	
Nitrogen, Ammonia (NH3-N) Total	Weekly Avg	14 mg/L	3/Week	24-Hr Flow Prop Comp	
Copper, Total Recoverable		ug/L	Quarterly	24-Hr Flow Prop Comp	
Zinc, Total Recoverable		ug/L	Quarterly	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	0.8 mg/L	3/Week	24-Hr Flow Prop Comp	Effective upon reissuance and this limit will be retained beyond the effective date of the final limits as it represents a minimum control level. See "Water Quality Trading (WQT)" sections for more information.
Phosphorus, Total		lbs/day	3/Week	Calculated	Report daily mass discharged using Equation 1a. in the "Water Quality Trading (WQT)" section.
WQT Credits Used (TP)		lbs/month	Monthly	Calculated	Report WQT TP Credits used per month using Equation 2b. in the "Water Quality Trading (WQT)" section. Available TP Credits are specified in Table 2 and in the approved Water Quality Trading Plan.
WQT Computed Compliance (TP)	Monthly Avg	0.42 mg/L	Monthly	Calculated	Report the WQT TP Computed Compliance value using Equation 3a. in the "Water Quality Trading (WQT)" section. Value entered on the last day of the month.
WQT Computed Compliance (TP)	6-Month Avg	0.14 mg/L	Monthly	Calculated	Value entered on the last day of the month. Value

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					entered at the end of the six-month period (June 30 and December 31).
WQT Computed Compliance (TP)	6-Month Avg	0.64 lbs/day	Monthly	Calculated	Report the WQT TP Computed Compliance value using Equation 3b. in the "Water Quality Trading (WQT)" section. Value entered on the last day June and December.
WQT Credits Used (TP)	Annual Total	149.4 lbs/yr	Annual	Calculated	The sum of total monthly credits used may not exceed Table 2 values listed below.
PFOS		ng/L	Annual	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
PFOA		ng/L	Annual	Grab	Monitoring only. See PFOS/PFOA Minimization Plan Determination of Need schedule.
Temperature		deg F	3/Week	Multiple Grab	See Temperature section below.
Acute WET		TUa	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET section below.
Chronic WET	Monthly Avg	1.7 TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET section below.
E. coli	% Exceedance	10 Percent	Monthly	Calculated	Limit and monitoring apply May-Sept. See E. coli section below.
E. coli	Geometric Mean - Monthly	126 #/100 ml	Weekly	Grab	Limit and monitoring apply May-Sept. See E. coli section below.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section below.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
					Series Monitoring section below.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual in rotating quarters. See Nitrogen Series Monitoring section below. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.

Changes from Previous Permit

Changes include 1) the addition of annual effluent monitoring for total nitrogen, nitrite + nitrate nitrogen and TKN, 2) seasonal fecal coliform limits have been replaced with *E. coli* limits, 3) changing effluent phosphorus compliance from a multi-discharger variance to a water quality trading plan which uses DNR approved projects to mitigate phosphorus discharges to the watershed, and 4) new PFOS/PFOA monitoring.

The monitoring frequency for PFOS and PFOA has been reduced from 1/ 2 Months to Annual.

Explanation of Limits and Monitoring Requirements

Water Quality Based Limits and WET Requirements and Disinfection (if applicable)

Refer to the WQBEL memo for the detailed calculations, prepared by the Water Quality Bureau dated April 3, 2023 used for this reissuance, in addition to the conditional WQT approval dated June 5, 2023.

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.

BOD, TSS, DO and pH

Monitoring and limits for these pollutants 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.

Copper and Zinc

Based on a comparison of the effluent data and calculated effluent limitations, effluent limitations are not required for copper or zinc. However quarterly monitoring will continue to ensure data collection for the next permit term.

E. Coli

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.

Phosphorus

Phosphorus requirements are based on the Phosphorus Rules that became effective December 1, 2010 as detailed in NR 102 Water Quality Standards and NR 217 Effluent Standards and Limitations for Phosphorus. Chapter NR 217 of the Wis. Adm. Code addresses point source dischargers of phosphorus to surface waters. Currently in NR 217 Wis. Adm. Code there are two methods used to determine if a phosphorus limit is needed: a technology based effluent limit (TBEL) and a water quality based effluent limit (WQBEL). Based on the size and classification of the stream, the water quality criteria for the Springville Branch of the Bad Axe River is 0.075 mg/L. In this case, *the WQBEL is 0.42 mg/L (monthly average), 0.14 mg/L & 0.64 lbs/day (6-month average).* For the reasons explained in the April 30, 2012 paper entitled 'Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin', WDNR has determined that it is impracticable to express the phosphorus WQBEL for the permittee as a maximum daily, weekly or monthly value. The final effluent limit for phosphorus is expressed as a six-month average. It is also expressed as a monthly average equal to three times the derived WQBEL (which equates to 0.3 mg/L). This final effluent limit was derived from and complies with the applicable water quality criterion. A phosphorus concentration limit is necessary to prevent backsliding during the term of the permit. The current MDV interim limit of 0.8 mg/L will be retained as a limit in the permit going forward as the minimum control level (MCL). An MDV county payment schedule item is included to cover MDV payments that accrued during the previous permit term (1/1/2023 – 9/30/2023).

The wastewater treatment facility is not able to meet the WQBEL with current treatment technology. This permit authorizes the use of trading as a tool to demonstrate compliance with the phosphorus WQBELs. This permit includes terms and conditions related to the Water Quality Trading Plan (WQT-2023-0003) or approved amendments thereof. The total 'WQT TP Credits' available are designated in the approved WQT Plan. The City is implementing streambank stabilization projects where the WQT plan proposes a total of 149.4 lbs/year of phosphorus credits for the next five years.

Additional WQT subsections in the permit provide information on compliance determinations, annual reporting and re-opening of the permit.

PFOS and PFOA

NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. Pursuant to s. NR 106.98(3)(b), Wis. Adm. Code, the department evaluated the need for PFOS and PFOA monitoring taking into consideration the presence of potential PFOS or PFOA industrial wastes, remediation sites 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 POTW has an indirect discharger(s) that may be a potential source of PFOS/PFOA. Therefore, monitoring once every two months is included. A sample frequency of 1/2 months means one sample is taken during any two-month period. Examples of 1/2 month sample would be every other month (Jan, March, May, etc.) or back-to-back months with a break in between (February & March, May & June, Aug & Sept, etc.). DMR Short Forms will be generated for the following time periods: January-February, March-April, May-June, July-August, September-October, and November-December. At a minimum one sample result will be present on each form.

The initial determination of the need for 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.

Pursuant to s. NR 205.066, Wis. Adm. Code, the department may specify the monitoring frequency for PFOS and PFOA on a case-by-case basis after the initial 24 months of sampling.

After a review of the data submitted with the Year 2 Report on Effluent Discharges, the department has determined that it is warranted to reduce the sampling frequency in this case. The department is requiring continued monitoring of these compounds to complete the permit term to ensure that the current effluent quality is maintained. At the next permit

reissuance, the department will make another determination as to whether further reduction or removal of monitoring is warranted, based on the continued sampling results.

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.
Comparing the representative highest effluent temperature to the calculated effluent limits determined the reasonable potential of exceeding the weekly average effluent limits for September through February.

However, the City of Viroqua has submitted a request for consideration of dissipative cooling, referencing a previous dissipative cooling study along with additional data taken during the month of November 2022. Based on the results of that study, the department has found that it is not necessary to include weekly average temperature limits in the reissued permit. Temperature monitoring continues as 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.

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.
There is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits based on recent data. However, the permit currently has weekly and monthly limits throughout the year. Where there are existing ammonia nitrogen limits in the permit, the limits must be retained regardless of reasonable potential, consistent with s. NR 106.33(1)(b), Wis. Adm. Code:

(b) If a permittee is subject to an ammonia limitation in an existing permit, the limitation shall be included in any reissued permit. Ammonia limitations shall be included in the permit if the permitted facility will be providing treatment for ammonia discharges.

In summary, after rounding to two significant figures, the 14 mg/L weekly average and 5.8 mg/L monthly average ammonia nitrogen limitations will continue for this permit reissuance. No mass limitations are recommended in accordance with s. NR 106.32(5), Wis. Adm Code.

Total Nitrogen Monitoring (NO2+NO3, TKN and Total N)

The Department has included annual 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 in the following quarters:

- 1st quarter (Jan – March) 2024
- 2nd quarter (April-June) 2025
- 4th quarter (Oct-Dec) 2026
- 3rd quarter (July – Sept) 2027
- 1st quarter (Jan – March) 2028

Whole Effluent Toxicity

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

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 1.7 TUc as a monthly average in the effluent limits table of the permit.

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.

Acute WET tests are required in the following quarters:

- 1st quarter (January – March) 2024
- 3rd quarter (July – Sept) 2027

Chronic WET tests are required in the following quarters:

- 1st quarter (Jan – March) 2024
- 2nd quarter (April-June) 2025
- 4th quarter (Oct-Dec) 2026
- 3rd quarter (July – Sept) 2027
- 1st quarter (Jan – March) 2028

4 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	Fecal Coliform	Injection	Land Applied	71 tons
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- HOLDING TANK LIQUID SLUDGE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Annual	Grab	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Grab	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Grab	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Grab	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Grab	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Grab	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Grab	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Grab	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Grab	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Grab	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Grab	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Grab	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Grab	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Grab	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Grab	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Grab	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Grab	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Grab	
Nitrogen, Total Kjeldahl		Percent	Annual	Grab	
Nitrogen, Ammonium (NH4-N) Total		Percent	Annual	Grab	
Phosphorus, Total		Percent	Annual	Grab	
Phosphorus, Water Extractable		% of Tot P	Annual	Grab	
Potassium, Total Recoverable		Percent	Annual	Grab	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Grab	Sample once in 2025.
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Grab	Sample once in 2025.

Changes from Previous Permit:

None

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).

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.

5 Schedules

5.1 PFOS/PFOA Minimization Plan Determination of Need

Required Action	Due Date
Report on Effluent Discharge: Submit a report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations. This analysis should also include a comparison to the applicable narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results.	09/30/2024
Report on Effluent Discharge and Evaluation of Need: Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan. This report shall include all additional PFOS and PFOA data that may be collected including any influent, intake, in-plant, collection system sampling, and blank sample results. The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan. If the Department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for Department approval no later than 90 days after written notification was sent from the Department. The Department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued. If, however, the Department determines there is no reasonable potential for the facility to discharge PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further	09/30/2025

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

5.2 Annual Water Quality Trading (WQT) Report

Required Action	Due Date
Annual WQT Report: Submit an annual WQT report that shall cover the first year of the permit term. The WQT Report shall include: The number of pollutant reduction credits (lbs/month) used each month of the previous year to demonstrate compliance; The source of each month's pollutant reduction credits by identifying the approved water quality trading plan that details the source; A summary of the annual inspection of each nonpoint source management practice that generated any of the pollutant reduction credits used during the previous year; and Identification of noncompliance or failure to implement any terms or conditions of this permit with respect to water quality trading that have not been reported in discharge monitoring reports.	01/31/2024
Annual WQT Report #2: Submit an annual WQT report that shall cover the previous year.	01/31/2025
Annual WQT Report #3: Submit an annual WQT report that shall cover the previous year.	01/31/2026
Annual WQT Report #4: Submit an annual WQT report that shall cover the previous year.	01/31/2027
Annual WQT Report #5: Submit the 4th annual WQT report. If the permittee wishes to continue to comply with phosphorus limits through WQT in subsequent permit terms, the permittee shall submit a revised WQT plan including a demonstration of credit need, compliance record of the existing WQT, and any additional practices needed to maintain compliance over time.	01/31/2028
Annual WQT Report Required After Permit Expiration: In the event that this permit is not reissued by the expiration date, the permittee shall continue to submit annual WQT reports by January 31 each year covering the total number of pollutant credits used, the source of the pollution reduction credits, a summary of annual inspection reports performed, and identification of noncompliance or failure to implement any terms or conditions of the approved water quality trading plan for the previous calendar year.	

5.3 Phosphorus Payment per Pound to County

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 ($52.02 per pound)] or $640,000, whichever is less. 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.	03/01/2024

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.	

Explanation of Schedules

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

Annual Water Quality Trading (WQT) Reports - Reports are required that include the following information:

- Verification that site inspections occurred;
- Brief summary of site inspection findings;
- Identification of noncompliance or failure to implement any terms or conditions of the permit or trading plan that have not been reported in discharge monitoring reports;
- Any applicable notices of termination or management practice registration; and
- A summary of credits used each month over the calendar year

MDV County Payments – Annual Payment Verification
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. This payment item is for MDV coverage 1/1/2023 – 9/30/2023 only.

Special Reporting Requirements

None

Fact Check Comments:

Updated permittee address to 124 West Decker St, Viroqua, WI

Public Notice Comments:

None

Attachments:

~~Water Quality Based Effluent Limits and WET Checklist Summary for the City of Viroqua WWTF, dated June 5, 2023~~

~~Water Quality Trading Plan Conditional Approval~~

~~Public Notice – Vernon County Broadcaster, PO Box 472, Viroqua, WI 54665-0472~~

PFOS and PFOA Water Quality-Based Effluent Limitations for the Viroqua Wastewater Treatment Facility -WPDES Permit No. (WI-0021920) in Vernon County, by Amy Garbe, PE, Wastewater Engineer, dated November 10, 2025

Proposed Expiration Date:

September 30, 2028

Justification Of Any Waivers From Permit Application Requirements

N/A

Prepared By:
Angela Parkhurst Wastewater Specialist
Date: September 6, 2023

Revised By: Sarah Donoughe, Wastewater Specialist-Adv
Date: November 17, 2025

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: November 10, 2025

TO: Sarah Donoughe – NER

FROM: Kari Fleming – WY/3

SUBJECT: PFOS and PFOA Water Quality-Based Effluent Limitations for the Viroqua Wastewater Treatment Facility -WPDES Permit No. (WI-0021920) in Vernon County

This is in response to your request for an evaluation of the need for PFOS and PFOA limitations for the Viroqua Wastewater Treatment Facility. This municipal wastewater treatment facility (WWTF) discharges to an unnamed tributary to the Springville Branch of the Bad Axe River, located in the Bad Axe River Watershed in the Bad Axe-La Crosse River Basin.

The current permit, effective since October 2023, has monitoring only for PFOS and PFOA. The following review is based on new regulations which are now in effect throughout the state of Wisconsin and recommendations are made in accordance with chapters NR 102, 104, 105, 106, 207, and 217 of the Wisconsin Administrative Code, where applicable.

Receiving Water Information

- Name: Unammed tributary to the Springville Branch of the Bad Axe River
- Classification: Limited Aquatic Life (LAL) community, non-public water supply
- Flow: Due to the nature of the receiving water, the 7-Q10, 7-Q2, and Harmonic Mean are estimated to be zero.
  7-Q10 = 0 cfs (cubic feet per second)
  7-Q2 = 0 cfs
  Harmonic Mean Flow = 0 cfs
- % of Flow used to calculate limits: 25%

Effluent Information

- Flow: Average Design Flow = 0.585 MGD (million gallons per day)
  For reference, the actual average flow from January 2023 to September 2025 was 0.206 MGD.
- Effluent characterization: This facility is categorized as a minor municipality.

The following table lists the statistics for effluent PFOS and PFOA levels from December 2023 through September 2025.

	PFOS ng/L	PFOA ng/L
1-day P_{99}	6.70	13.81
4-day P_{99}	4.95	8.33
30-day P_{99}	4.02	5.56
Mean	3.54	4.30
Std	1.06	2.67
Sample Size	12	12
Range	2.37-5.89	1.66-10.2

Water Quality Based Limit – PFOS and PFOA
Administrative rules for PFOS and PFOA took effect on August 1, 2022. These rule revisions include additions to ch. NR 102 (s. NR 102.05), Wis. Adm. Code, which establish PFOS and PFOA standards for surface waters. Revisions to ch. NR 106 (s. NR 106, Subchapter VIII), Wis. Adm. Code establish procedures for determining water quality based effluent limits for PFOS and PFOA, based on the applicable standards in ch. NR 102, Wis. Adm. Code.

PFOS
Due to PFOS being a bioaccumulating compound of concern (BCC), no mixing zone is allowed pursuant to s. NR 106.98(4), Wis. Adm. Code. Therefore, the effluent limit for PFOS is set equal to criterion (8 ng/L).

PFOA
The conservation of mass equation is described in s. NR 106.06(4)(b)1. Wis. Adm. Code, and includes variables of water quality criterion (WQC), receiving water flow rate (Qs), effluent flow rate (Qe), and upstream PFOA concentrations (Cs) provided below.

$$\text{Limitation} = [(WQC)(Qs+(1-f)\ Qe) - (Qs-f\ Qe)\ (Cs)]/Qe$$

Where:

WQC = 95 ng/L for the unnamed trib to Springville Branch
Qs = 25% of the harmonic mean pursuant s. NR 106.06(4)(c)10., Wis. Adm. Code = 0 cfs
Cs = background concentration of PFOA in the receiving water pursuant to s. NR 106.06(4)(e), Wis. Adm. Code
Qe = effluent flow rate = 0.585 MGD = 0.905 cfs
f = the fraction of effluent withdrawn from the receiving water = 0

After substituting the appropriate variables, the calculated PFOA limit is 95 ng/L.

Reasonable Potential Determination
In accordance with s. NR 106.98(4)(a), Wis. Adm. Code, **the discharge does not have reasonable potential to cause or contribute to an exceedance of the water quality criterion for PFOS** because the 30-day P_{99} of reported effluent PFOS data is less than the calculated WQBEL (8 ng/L). Therefore, **a WQBEL is not required.**

The discharge does not have reasonable potential to cause or contribute to an exceedance of the water quality criterion for PFOA because the 30-day P_{99} of reported effluent PFOA data is less than the calculated WQBEL (95 ng/L). Therefore, **a WQBEL is not required.**

Conclusions
The discharge has no reasonable potential to cause or contribute to an exceedance of the water quality criterion for PFOS nor PFOA. Therefore, no WQBELs are required.

Pursuant to s. NR 205.066, Wis. Adm. Code, the department may specify the monitoring frequency for PFOS and PFOA on a case-by-case basis after the initial 24 months of sampling. **After a review of the available data, the department has determined that it is warranted to reduce the sampling frequency in this case to annually.**

If there are any questions or comments on these recommendations, please contact Amy Garbe by telephone at (608) 716-9968 or by email at Amy.Garbe@wisconsin.gov.

Attachments (2) – P99 Calculations

PREPARED BY: _____ date: 11/10/25

Amy Garbe, P.E., Wastewater Engineer

cc: Katie Jo Jerzak, Basin Engineer, P.E. – WCR/Eau Claire
Nate Willis, P.E., PFAS Implementation Coordinator – CO

Attachment 1 – PFOS P99 Calculation

EFFLUENT VARIABILITY ANALYSIS -				
=	= =	=	=	
SUBSTANCE:				
NUMBER OF VALUES:				
TOTAL	12			
DETECTED	12			
NON-DETECTED				
d	0			
m	3.544167			
mean of all data	3.544167			
s	1.056843			
n	1	4	30	
d^n	0	0	0	
p	0.99	0.99	0.99	
Z_p	2.326785	2.326785	2.326785	
1+(s/m)^2	1.088919	1.088919	1.088919	
(sigma_d)^2	0.085185	0.085185	0.085185	
mu_d	1.22271	1.22271	1.22271	
(sigma_dn)^2	0.085185	0.021986	0.00296	
mu_dn	1.22271	1.25431	1.263823	
P_99 exponent	1.901817	1.59932	1.390405	
P_99	6.70	4.95	4.02	

Data Summary	
Dec-23	3.72
Jan-24	2.89
Mar-24	3.86
May-24	2.77
Jul-24	5.3
Sep-24	5.89
Nov-24	3.45
Jan-25	2.73
Mar-25	3.41
May-25	2.37
Aug-25	3.18
Sep-25	2.96

Attachment 2 – PFOA P99 Calculation

EFFLUENT VARIABILITY ANALYSIS -			
SUBSTANCE:			
NUMBER OF VALUES:			
TOTAL	12		
DETECTED	12		
NON-DETECTED	0		
d	0		
m	4.299167		
mean of all data	4.299167		
s	2.674256		
n	1	4	30
d^n	0	0	0
p	0.99	0.99	0.99
Z_p	2.326785	2.326785	2.326785
1+(s/m)^2	1.386934	1.386934	1.386934
(sigma_d)^2	0.327096	0.327096	0.327096
mu_d	1.294873	1.294873	1.294873
(sigma_dn)^2	0.327096	0.092336	0.012815
mu_dn	1.294873	1.412253	1.452014
P_99 exponent	2.625615	2.119291	1.715417
P_99	13.81	8.33	5.56

Data Summary

Dec-23	4.6
Jan-24	1.66
Mar-24	2.16
May-24	10.2
Jul-24	5.98
Sep-24	3.65
Nov-24	2.19
Jan-25	1.7
Mar-25	2.21
May-25	4.34
Aug-25	5.01
Sep-25	7.89