BUREAU OF WATER QUALITY
PROGRAM GUIDANCE

WASTEWATER POLICY MANAGEMENT TEAM

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Monitoring Frequencies for Individual Wastewater Permits

March 22, 2021

EGAD Number: 3400-2021-07

*This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute**s** or administrative rule**s** are referenced. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.*

APPROVED:

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4/12/2021
Date

Introduction

Wastewater permits require the permittee to conduct routine monitoring at designated sample points (including influent, effluent, and/or in-plant sampling points) and report the analytical results, so that the department can evaluate discharge conditions and determine compliance status. This guidance recommends that standard monitoring frequencies be included in individual wastewater permits based on the size and type of the facility. A base-level, standard amount of monitoring within similar facility types is necessary to clearly characterize effluent quality and variability, to detect events of noncompliance, and to insure fairness and consistency.

This guidance also describes when reporting and monitoring requirements may be reduced based on excellent historical performance. Reductions in monitoring frequency should only be considered if requested by the permittee, preferably at the time of permit application. Final decisions regarding monitoring frequencies should be made by the permit drafter after consultation with compliance and Water Quality-Based Effluent Limits (WQBEL) staff (as needed). The permit drafter should explain the reasons for any changes made from previous permit conditions in the permit fact sheet.

There may be reasons for deviating from the monitoring frequencies recommended in this guidance. If staff believe that deviations from the standard (or minimum) monitoring frequencies are appropriate for a given permittee or pollutant, they should clearly document the site-specific conditions that warrant a change in frequency in the permit fact sheet. This will provide others with an understanding of why decisions were made.

This guidance does not address monitoring frequencies for general permits or monitoring that is required in permit applications. It is only intended to cover wastewater effluent samples. Thus, it does not cover intake waters, receiving waters, or groundwater monitoring wells.

Monitoring Regulations

Federal regulations require the establishment of monitoring and reporting conditions in National Pollutant Discharge Elimination System (NPDES) permits:

- **40 CFR 122.44(i)** requires that permittees monitor pollutant mass (or other measure specified in the permit) and effluent volume and provide other measurements (as appropriate) using the test methods established at 40 CFR Part 136. This subpart also states that some NPDES permittees may be required to monitor all limited pollutants and report data at least once per year. NPDES permits that do not require an annual monitoring result report must report instances of noncompliance at least once per year.

- **40 CFR 122.48** provides that all NPDES permits must specify requirements concerning the proper use, maintenance, and installation of monitoring equipment or methods. NPDES permits must also specify the monitoring type, intervals, and frequency sufficient to yield data that are representative of the monitored activity.

The following state statutes and administrative code provisions address monitoring requirements in Wisconsin Pollutant Discharge Elimination System (WPDES) permits:

- **Section 283.55, Wis. Stats.,** requires all permittees to establish and maintain records of the volume of effluent and the amount of each pollutant discharged from each point source under the owner or operator's control. Permittees must also make regular reports of this information to the department.

- **Section NR 108.06(4)(b), Wis. Adm. Code**, requires all permittees provide adequate flow measurement and recording equipment to measure the volume of effluent discharged from their facility and to report it to the department at the frequency specified in the permit.

- **Section NR 205.066(1), Wis. Adm. Code**, states that the department shall determine on a case−by−case basis the monitoring frequency to be required for each effluent limitation in a permit. Monitoring shall occur at the point of discharge or at the internal waste stream if the permit limitations are imposed on the internal waste stream under s. NR 205.065(2), Wis. Adm. Code, unless an alternative location is established by the department in the permit.

- **Section NR 210.04, Wis. Adm. Code**, states that publicly and privately owned sewage treatment facilities must, at minimum, monitor the effluent for BOD5, suspended solids, and pH, while influent wastewater need only be monitored for flow, BOD5 and suspended solids. It also specifies that the department shall require the use of 24−hour flow proportional samplers for monitoring influent and effluent quality except where the department determines through the permit issuance process that other sample types may adequately characterize the influent or effluent quality. In evaluating permit monitoring requirements, the department may consider: (a) treatment facility design flow and actual flow; (b) type of treatment processes used at the facility; (c) previous performance records as reported on the discharge monitoring report; (d) type of wastewater treated (domestic, municipal or industrial); and (e) final effluent limitations. Finally, it specifies that the methods used for sampling shall be as described in s. NR 218.04 (10) to (17).

- **Section NR 214.12, Wis. Adm. Code**, **Absorption pond systems.** (4) DISCHARGE MONITORING REQUIREMENTS.

  (a) The discharge to each absorption pond cell shall be monitored for total daily discharge volume.

  (b) The department may require in a WPDES permit that the discharge be monitored for BOD5, total suspended solids, forms of nitrogen, chloride, metals or any other pollutant that may be present. The department shall select the pollutants to be monitored and the required frequency of monitoring on a case−by−case basis by considering the potential public health impacts, probable environmental impact, soil and geologic conditions, past operating performance, concentrations and characteristics of pollutants in the discharge, and other relevant information.

  (c) The department may require electronic or paper submittal of discharge monitoring reports and land application forms.

- **Section NR 214.13, Wis. Adm. Code, Ridge and furrow systems.** (4) DISCHARGE MONITORING REQUIREMENTS.

  (a) The discharge to each cell of the ridge and furrow system shall be monitored for total daily flow.

  (b) The department may require in a WPDES permit that the discharge be monitored for BOD5, total suspended solids, forms of nitrogen, chloride, metals or any other pollutant that may be present. The department shall select the pollutants to be monitored and the required frequency of monitoring on a case−by−case basis by considering the potential public health impacts, probable environmental impact, soil and geologic conditions, past operating performance, concentrations and characteristics of pollutants in the discharge and other relevant information.

  (c) The department may require electronic or paper submittal of discharge monitoring reports and land application forms.

- **Section NR 214.14, Wis. Adm. Code, Spray irrigation systems.** (4) DISCHARGE MONITORING REQUIREMENTS.

  (a) The discharge to spray irrigation systems shall be monitored for total daily flow.

(b) The department may require in a WPDES permit that the discharge be monitored for BOD5, total suspended solids, forms of nitrogen, chloride, metals or any other pollutant that may be present. The department shall select the pollutants to be monitored and the required frequency of monitoring on a case−by−case basis by considering the potential public health impacts, probable environmental impact, soil and geologic conditions, past operating performance, concentrations and characteristics of pollutants in the discharge and other relevant information.

- **Section NR 214.15, Wis. Adm. Code, Overland flow systems.** (4) DISCHARGE MONITORING REQUIREMENTS.

  (a) The overland flow system discharge shall be monitored for total daily flow.

  (b) The department may require in a WPDES permit that the discharge be monitored for BOD5, total suspended solids, forms of nitrogen, chloride, metals or any other pollutant that may be present. The department shall select the pollutants to be monitored and the required frequency of monitoring on a case−by−case basis by considering the potential public health impacts, probable environmental impact, soil and geologic conditions, past operating performance, concentrations and characteristics of pollutants in the discharge and other relevant information.

  (c) The department may require electronic or paper submittal of discharge monitoring reports and land application forms.

- **Section NR 214.16, Wis. Adm. Code, Subsurface absorption systems.** (4) DISCHARGE MONITORING REQUIREMENTS.

  (a) The discharge to the subsurface absorption system shall be monitored for total daily discharge volume.

  (b) The department may require in a WPDES permit that the discharge to the system be monitored for BOD5, total suspended solids, forms of nitrogen, chloride, metals or any other pollutant that may be present. The department shall select the pollutants to be monitored and the required frequency of monitoring on a case−by−case basis by considering the potential public health impacts, probable environmental impact, soil and geologic conditions, past operating performance, concentrations and characteristics of pollutants in the discharge and other relevant information.

  (c) The department may require electronic or paper submittal of discharge monitoring reports and land application forms.

- **Chapter NR 218, Wis. Adm. Code,** describes the appropriate method and manner of obtaining effluent samples in compliance with the monitoring requirements of ch. 283, Stats., and WPDES permits.

Standard Monitoring Frequencies

Staff should set monitoring frequencies in permits for individual pollutants that provide enough information to characterize effluent quality and variability, to detect events of noncompliance, and to consider future data needs. Table 1 lists standard monitoring frequencies that are recommended as a starting point for most discharge situations where a final effluent limit is given. Situations where an interim limit or no limit (monitoring only) is given in the permit may justify other monitoring frequencies. In those situations, permits staff should consult with WQBEL calculators and/or policy experts and consult pollutant-specific guidance documents to determine the appropriate monitoring frequency for the given pollutant.

The standard monitoring frequencies recommended in Table 1 are intended to apply in most situations, but there may be cases where site-specific conditions justify other monitoring frequencies. When establishing a monitoring frequency for an individual discharge, staff should consider factors that may necessitate more frequent or less frequent monitoring. For example, staff should consider the effluent's variability by reviewing effluent data for the parameter or, in the absence of actual data, information from similar dischargers. A variable effluent (particularly in terms of flow and

pollutant concentration) should be monitored more frequently than an effluent that is relatively consistent over time. Other factors that should be considered when establishing monitoring frequencies include the following:

- **Treatment facility design flow and organic capacity.** Monitoring frequencies may need to be increased at facilities where the wastewater treatment plant (WWTP) is nearing design capacity, either flow or organic loading (BOD). For example, an overloaded facility that experiences fluctuating flow from infiltration or organic loadings from large batch discharges from an industrial user should be given more frequent monitoring. The Compliance Maintenance Annual Report (CMAR) can be used to evaluate when a municipal WWTP is nearing capacity.

- **Type of treatment processes used at the facility.** Monitoring frequencies should be similar for similar WWTP processes. For example, an industrial facility employing biological treatment might have a similar monitoring frequency as a secondary treatment plant with the same units used for wastewater treatment. If wastewater treatment is achieving high pollutant removals on a consistent basis, monitoring could be less frequent than for a facility with no or insufficient treatment.

- **Compliance history.** The monitoring frequency might need to be adjusted to reflect the compliance history of the facility based on information reported in discharge monitoring reports. A facility with patterns of noncompliance may be required to perform more frequent monitoring to characterize the source or cause of the problems or to detect future noncompliance.

- **Type of wastewater treated.** Monitoring frequency should increase as an effluent's complexity increases. For example, an effluent containing only domestic wastewater may be less variable day-to-day than effluent with industrial contributions and, therefore, might warrant less frequent monitoring.

- **Number of samples needed to determine compliance with effluent limitations.** When establishing monitoring frequency, staff should consider the type of limit to be assigned. For example, if the permit contains a monthly average limit, the monitoring frequency should be no less than monthly. Monitoring less frequently than the averaging period for the limit could make it more difficult for the discharger to comply with its limit. Parameters with shorter-term permit limits (i.e. weekly) should be monitored more frequently than the parameters with longer permit limits (i.e. monthly). In most cases, monitoring should not be reduced below once per week where there are weekly permit limits, below once per month where there are monthly permit limits, and so forth.

- **Nature of the pollutants.** To accurately characterize the discharge, the monitoring frequency may be increased for wastewaters with toxic pollutants or where the nature of the pollutants is variable.

- **Frequency of the discharge.** The seasonality of the discharge (e.g., fill and draw) and/or the production schedule of an industrial facility and similar factors should be considered when determining monitoring frequencies. The monitoring frequency for an infrequently discharged wastewater often differs from that for a continuous discharge.

- **Number of samples needed to calculate WQBELs.** When establishing monitoring frequency, staff should consider the number of samples that will be necessary at the next permit reissuance to properly determine reasonable potential when developing WQBELs. Staff should refer to WQBEL memos for any recommended monitoring frequencies.

- **Seasonal or Monthly Limits.** At a minimum, monitoring frequencies should correspond to the periods for which limits are to be set. For example, if a facility has monthly limits that were calculated using monthly Q7,10 information, the minimum amount of monitoring that should be required would be monthly.

Performance-Based Reductions of Monitoring Frequencies

Table 1 lists minimum monitoring frequencies that may be given in situations where there is a history of excellent performance. The minimum monitoring frequencies recommended in Table 1 are intended to apply in most situations, but there may be cases where site-specific conditions call for other monitoring frequencies. If staff believe that deviations from the minimum monitoring frequencies are appropriate for a given permittee or pollutant they should clearly document the site-specific conditions that call for a change in frequency in the permit fact sheet, so that others can tell why decisions were made.

In 1996, the United States Environmental Protection Agency (USEPA) issued "Interim Guidance for Performance-Based Reductions of NPDES Permit Monitoring Frequencies" (www.epa.gov/npdes/pubs/perf-red.pdf). Under this USEPA guidance, reporting and monitoring requirements may be reduced based on a demonstration of excellent historical performance. Facilities can demonstrate excellent performance by meeting a set of compliance and enforcement criteria and by demonstrating their ability to consistently discharge pollutants below the levels necessary to meet existing permit limitations. Reductions are determined parameter-by-parameter, based on the existing monitoring frequency and the percentage below the limitation at which the parameter is being discharged. To remain eligible for the reductions, permittees are expected to maintain excellent performance levels for each parameter and a good compliance record on which the reductions were based.

Factors to Consider in Reducing the Monitoring Frequency

Facility Compliance History. The compliance history of each facility should be reviewed to assess eligibility for monitoring frequency reductions. Drafters should consult with compliance staff if there are questions about a facility's compliance history or whether there have been civil or criminal violations for a given facility.

- The permittee should demonstrate a history of consistent compliance with existing permit limits.
- Permitted facilities found liable for a civil violation of WPDES statutes may be eligible for consideration for reduced monitoring no sooner than 1 year after completion of injunctive relief and payment of penalty.
- The permitted facility or persons in charge should not have been convicted of a criminal violation for any environmental statute. Case-by-case exceptions may be made if it is determined there has been a wholesale change of ownership and/or management of the facility.

Parameter-by-Parameter Compliance History. The compliance history for each parameter should be evaluated for the latest 3-year period to determine the potential for monitoring reductions. Critical parameters may be evaluated over a longer period, as determined at the discretion of the department, and may include pollutants which pose a higher risk to human or environmental health. The results of this examination should determine which parameters are eligible for monitoring reductions.

- Reduced monitoring should not be allowed for parameters for which there have been noncompliance or reporting violations within the last 24 months. A permitted facility with minor permit violations may be considered for reduced monitoring if the quality of the effluent has improved due to a demonstrable change in loading, source reduction measures, modification in operation and maintenance procedures, or to the installation of additional treatment units.
- Both the historical variability of treatment efficiency and fluctuations in loads to the plant and the level of operational control needed to maintain the consistency of the treatment system should be a factors when deciding if a permitted facility is eligible for monitoring reduction. A wide variability in treatment efficiency may be a factor in maintaining more frequent monitoring even in the absence of permit violations.

Continued Eligibility for Reductions. The department regularly checks for significant compliance and effluent violations of critical parameters, failure to submit monitoring reports, and any needed enforcement actions. If violations do occur, the department may require increased monitoring as a part of a permit modification/reissuance.

Timing of Decisions. Monitoring reductions may be considered when a permit is reissued or when a permit is modified to accommodate other issues (permits are not typically modified just to reduce monitoring frequency). Permit monitoring requirements may contain conditions for decreases in monitoring frequency if specified performance conditions are met and/or require increased monitoring if performance levels decline.

- Newly permitted facilities should complete one full permit cycle (5 years) before being eligible for reduced monitoring consideration.

- In most cases, monitoring frequencies that are less than once per quarter should not be given. Exceptions may be made for some parameters, if recommended in other guidance that addresses that pollutant (e.g., WET monitoring). Exceptions may be granted in unusual circumstances of reliable performance at or above the requisite levels and for outstanding compliance histories.

Reporting and monitoring requirements may be reduced for facilities that demonstrate excellent performance and an ability to consistently reduce pollutants below levels necessary to meet existing permit requirements. Reducing monitoring frequencies may also provide an incentive for voluntary reductions of pollutant discharges through reuse and recycling. Facilities should maintain excellent performance levels to continue to receive monitoring frequency reductions in future permit terms.

Recommended Monitoring Frequencies

Table 1 lists standard and minimum monitoring frequencies for situations where excellent performance levels have been demonstrated. These standard and minimum monitoring frequencies are intended to apply in most typical discharge situations where final limits are in effect. Different monitoring frequencies may be appropriate on a case-by-case basis depending on site-specific conditions and the best professional judgment of permits staff. In some cases, there may be parameter-specific guidance that also addresses monitoring frequencies for a given pollutant. If there is parameter-specific guidance, staff should consult that before proceeding. (Some of these are listed in Table 1.)

Table 1. Recommended Monitoring Frequencies

Limit Type in Permit	Parameter	Facility		Monitoring Frequency[7] (influent & effluent)			
		Category	Type	Surface Water		Land Treatment/Disposal	
				Standard	Minimum	Standard	Minimum
Technology Based Effluent Limits (TBEL)	BOD, CBOD[1], TSS, phosphorus TBELs	Municipal	Major ≥ 2 MGD	Daily (7x week)	5x week	Daily (7x week)	5x week
		Municipal	Major < 2 MGD	Daily (7x week)	3x week	Daily (7x week)	3x week
		Municipal	Minor ≥ 0.25 MGD	5x week	3x week	5x week	3x week
		Municipal	Minor < 0.25 MGD	3x week	2x week	3x week	2x week
		Municipal	Recirculation sand filters	2x week	2x week	2x week	2x week
		Municipal	Stabilization pond (fill & draw)[8]	3x week during discharge	1x week during discharge	1x week	2x month
		Municipal	Stabilization pond (continuous)	2x week	1x week	1x month	1x month
		Municipal	Aerated lagoon (continuous discharge)	2x week	1x week	2x week	1x week
		Industry	Pulp/Paper	Daily	5x week	NA	NA
		Industry	Dairy	3x week	1x week	1x month	1x quarter
		Industry	Food (Fruit & Vegetable)	1x week during discharge	1x month during discharge	1x month during discharge	1x quarter during discharge
		Industry	Meat	3x week	1x week	case-by-case	case-by-case
		Industry	Power Generation	1x week	1x quarter	NA	NA
		Industry	Fish Hatchery	1x month	1x quarter	case-by-case	case-by-case
		Industry	Other	case-by-case	case-by-case	case-by-case	case-by-case
	Flow[2], pH, chlorine[3], D.O.[4]	Municipal	Major	Daily (7x week)	5x week	Daily (7x week)	5x week
		Municipal	Minor	Daily (7x week)	5x week	Daily (7x week)	5x week
		Industry	Primary	Daily (7x week)	5x week	Daily (7x week)	5x week
		Industry	Secondary	Daily (7x week)	5x week	Daily (7x week)	5x week
Water Quality Based Effluent Limits (WQBEL)	Toxics[5] – NR 105, Table 1 & 2 (aquatic life, acute, daily max)	All	All	Monthly	Quarterly	NA	NA
	Toxics[5] – NR 105, Table 5 & 6 (aquatic life, chronic, weekly avg)	All	All	Monthly	Quarterly	NA	NA
	Toxics[5] – NR 105, Table 7 (wildlife, monthly avg)	All	All	Monthly	Quarterly	NA	NA
	Toxics[5] – NR 105, Table 8 (HTC, monthly avg)	All	All	Monthly	Quarterly	Site-specific	Site-specific
	Toxics[5] – NR 105, Table 9 (HCC, monthly avg)	All	All	Monthly	Quarterly	Site-specific	Site-specific
	Mercury	All	All	See s. NR 106.145(3)(a)(6), Wis. Adm. Code.			
	Chloride	All	All	4x month on consecutive days each month			
	Ammonia[6,7]	Municipal	Major ≥ 2 MGD	Daily (7x week)	5x week	Daily (7x week)	5x week
		Municipal	Major < 2 MGD	Daily (7x week)	3x week	Daily (7x week)	3x week
		Municipal	Minor ≥ 0.25 MGD	5x week	3x week	5x week	3x week
		Municipal	Minor < 0.25 MGD	3x week	2x week	3x week	2x week
		Industry	Pulp/Paper	1x week	1x month	NA	NA
		Industry	Dairy	3x week	1x week	2x month	1x month

		Industry	Food (Fruit & Vegetable)	1x week	1x month	2x month	1x month
		Industry	Meat	3x week	1x week	case-by-case	case-by-case
		Industry	Fish Hatchery	1x week	1x quarter	case-by-case	case-by-case
		Industry	Other	case-by-case	case-by-case	case-by-case	case-by-case
	Bacteria (*E. coli* & fecal coliform)	See Implementation of Bacteria Water Quality Standards in Wastewater Permits					
	Dissolved criteria limits	See Calculating WQBELs for Surface Water Discharges					
	Phosphorus	See Guidance for Implementing Wisconsin's Phosphorus Water Quality Standards for Point Source Discharges					
	Temperature	See Guidelines for Implementation of Wisconsin's Thermal Water Quality Standards					
	Whole Effluent Toxicity (WET)	See recommendations in WQBEL memo & guidance in Ch 1.3 of WET Guidance Document					
Monitoring Only	Nitrogen, Total	See Guidance for Total Nitrogen Monitoring in Wastewater Permits					
	Parameter near reasonable potential[5]	Monthly monitoring during the 4th year of the permit term[5]					
	Phosphorus	See Guidance for Implementing Wisconsin's Phosphorus Water Quality Standards for Point Source Discharges					
	Whole Effluent Toxicity (WET)	See recommendations in WQBEL memo & guidance in Ch 1.3 of WET Guidance Document					

Table notes:

[1]**CBOD:** when CBOD limits are required, influent monitoring must include CBOD and BOD (s. NR 210.07, Wis. Adm. Code). Influent BOD monitoring may be reduced to 1x month in these situation

[2] **Flow:** Only influent flow monitoring may be present in situations where the WWTP was not designed with effluent flow monitoring. However, effluent flow monitoring should be addressed the next time that the WWTP undergoes an upgrade.

[3] **Chlorine Residual:** Reduced monitoring for chlorine may be considered if the treatment efficiency is consistent and the chlorine feeder is paced with the effluent flow. The monitoring for chlorine should not be reduced if the limits are based on the flow of the receiving stream or if the discharge is upstream from a public water supply intake.

[4] **Dissolved Oxygen:** A reduction in monitoring for DO may be allowed if the limit is part of a categorical standard specified in s. NR 210.05(2), Wis. Adm. Code, for intermediate (limited aquatic life) waters or s. NR 210.05(3), Wis. Adm. Code, for marginal (limited forage fish) waters. A reduction in monitoring should not be allowed if the limit has been increased above 7 mg/l to allow for a higher BOD limit.

[5] **Reasonable Potential:** When less than 11 detects are available for a given parameter, reasonable potential to exceed a water quality standard is determined by comparing the average of effluent data to one fifth of the calculated WQBEL. This can result in triggering a limit that would not be required if more data were available. To avoid a situation where there is continually limited effluent data, when averages exceed one fifth of the limits monitoring should be required in the permit at a frequency to ensure that at least 11 effluent data are available at the next reissuance. Sampling frequencies should be based on specific needs, but are usually monthly for one year or quarterly for the permit term in order to account for seasonality and other effluent variability.

[6] **Ammonia:** The monitoring frequencies shown in the table for ammonia are intended to apply to mechanical plants that discharge continuously. Other facility types, such as lagoons and recirculating sand filters, may require different frequencies to better characterize their effluents, since ammonia tends to vary more seasonally and less throughout a given week at these types of facilities. Monitoring frequencies in permits for these types of facilities should be designed to capture the seasonal variability expected for that discharge.

[7] Municipal land disposal systems will typically monitor the entire N series, while industrial land disposal will vary and perhaps only monitor for TKN.

[8] Since effluent variability for a fill and draw system may be more influenced by flow rate than facility type, staff should compare monitoring frequencies recommended according to design flow to determine which is more appropriate for the given discharge.

"**NA**", or not applicable, was added to the table to indicate that there were no permittees in the category when this guidance was written. "**Case-by-case**" was added to the table when there were only one or a few permittees that fell into the category. If a permittee falls into either of these categories, staff should use their best professional judgment to decide on a reasonable monitoring frequency in consideration of the pollutant, discharge category, and compliance history for the discharge in question.