SECTION MN-1

MUNICIPAL VPDES DRAFTING

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A. Sampling

1. Introduction

All VPDES permits require a sampling and analysis program to demonstrate compliance with the effluent limitations specified in Part I.A of the permit. The minimum sampling program schedules for sewage discharges in this section have been approved by the Department and EPA. Certain permits may have basin-specific or parameter-specific monitoring frequencies based on Board/EPA agreements (i.e. Chesapeake Bay tributary strategies). These schedules may also be modified for sewage treatment plants operated under a Department approved upgrade. Design flow and type of disinfection determines which sampling program schedule in the following table applies. Based on the nature of the discharge (i.e. batch treatment process), a permit writer may exercise discretion and determine that sampling requirements are more or less stringent than necessary for a facility and use another frequency. **Document the rationale for this alternate frequency in the Fact Sheet.**

2. Sample Types

a. All influent samples are collected preceding all treatment units; however, samples may be taken following bar screening.

b. All effluent samples are to be taken at a point following all treatment processes or as otherwise indicated in the permit.

c. Grab samples from the final effluent are required for total residual chlorine, bacteria, pH, D.O., oil and grease, cyanide, acid and base/neutral extractable organics, volatile organics, pesticides/PCBs, phenols, xylenes and dissolved metals. Note that per 40 CFR Part 136, for dissolved metals, samples should be filtered within 15 minutes of collection before adding preservative.

d. Immersion stabilization is required for temperature measurements.

e. When D.O. sampling is required, ensure daily sampling and immediate (in-situ) analysis.

f. At facilities where continuous chlorine monitoring is used, the values at the required frequency should be taken at consistent time intervals to avoid "shopping" for values that meet permit limits.

g. Composite samples consist of grab samples taken at a minimum frequency of one per hour and combined in proportion to flow. Greater frequency of grab sampling is required where abnormal variation in waste strength occurs. Automatic samplers are considered a viable sampling method.

3. Sampling Schedule

The following page contains the sample type and frequency recommendations for Municipal Treatment Plants. Most of the information in the table are from the 9VAC25-790 Sewage Collection and Treatment Regulation.

4. Sampling Schedule Table

PLANT SIZE	>2.0 MGD	1.0-2.0 MGD	0.101-0.999 MGD	0.0401-0.1 MGD	0.0011-0.04 MGD
Flow	Totalizing, Indicating & Recording (continuous)	Totalizing, Indicating & Recording (continuous)	Totalizing, Indicating & Recording (continuous)	Totalizing, Indicating & Recording (continuous)	Estimate (1/Day)
BOD_5, TSS[1], TKN, Ammonia (NH3)	24-HC 5-7 Days/ Week	24-HC 5 Days/ Week	8-HC 3 Days/ Week	4-HC 1/ Week	Grab 1/month
Total Nitrogen[2] Total Phosphorus[2]	24-HC 1/ Week	24-HC 1/ Week	8-HC 1/ 2 Weeks	4-HC 1/ Month	Grab 1/month
BOD_5 Ammonia Controlling [3]	24-HC 1/ Week	24-HC 1/ Week	8-HC 1/ 2 Weeks	4-HC 1/ Month	Grab 1/month
TRC, Contact tank	Grab 1/2Hrs	4/Day at 4 Hr.Intervals	3/Day at 4 Hr.Intervals	3/Day at 4 Hr.Intervals	Grab 1/Day
Chlorine Effluent	Grab 1/2Hrs	4/Day at 4 Hr.Intervals	3/Day at 4 Hr.Intervals	3/Day at 4 Hr.Intervals	Grab 1/Day
Bacteria[4] Chlorine Disinfection	4/mo (weekly) 10am-4pm	4/mo (weekly) 10am-4pm	4/mo (weekly) 10am-4pm	4/mo (weekly) 10am-4pm	4/mo (weekly) 10am-4pm
Bacteria Alternate Disinfection	Grab 1/Day 10am-4pm	Grab 5 Days/Week 10am-4pm	Grab 3 Days/Week 10am-4pm	Grab 2 Days/Week 10am-4pm	Grab 1/Week 10am-4pm
pH, DO	Grab 1/Day	Grab 1/Day	Grab 1/Day	Grab 1/Day	Grab 1/Day
WQS Parameters Toxics (other than NH3)	1/8H, or 24 HC or 1/Month	1/8H, or 24 HC or Grab 1/Month	1/8H, or 8HC or Grab 1/Month	1/8H, or 4HC or Grab 1/Month	Grab 1/Month

[1] Applicable when TSS limits required for special standards or regulations (e.g., 9VAC25-260-310, Special Standards and requirements; 9VAC25-415, Policy for Potomac Embayments). Otherwise 1/month is acceptable and should not be reduced further (this includes a sediment TMDL and the Chesapeake Bay TMDL)

[2] Applicable for the parameter that is limited in the individual VPDES permit. Annual average TN and TP limitations included in the permits in the Chesapeake Bay watershed should include sample types and frequencies consistent with those included in the watershed general permit. See monitoring requirements 9VAC25-820-70 E.

[3] This BOD sampling frequency is applicable when ammonia limits control treatment levels for BOD, provided the NH3 sampling frequencies in the BOD_5, TSS[1], TKN, NH3 row of this table are applied.

[4] Sampling frequencies are acceptable provided TRC sampling frequencies in this table are applied. If the facility has discontinuous discharge and 4 monthly samples are difficult to obtain, use a monthly single sample maximum of 235 CFU/100 ml instead of monthly geometric mean of 126 CFU/100ml.

NOTE: Bacteria frequencies also apply to facilities identified in an EPA approved TMDL and the TMDL contains a bacteria waste load allocation for that facility.

5. Monitoring Reductions for Reissuances

a. Qualification Criteria

Per GM24-2004, reduced monitoring may be provided to certain facilities based on their performance and compliance history. The procedures outlined in this section represent the updated recommendations. Permit writers should evaluate with each reissuance whether a facility qualifies for reduced monitoring. Monitoring frequency reductions are not considered effluent limitations under section 402(o) of the Clean Water Act, and therefore anti-backsliding prohibitions would not be triggered by reductions in monitoring frequencies. Some facilities and parameters (e.g., chemicals for disinfection (chlorine) and dechlorination) are not eligible for reduced monitoring to ensure protection of aquatic life and human health. For further details see subdivision A.5.d. (Special Considerations).

The following should be considered when facilities are evaluated for reduced monitoring:

1) Seasonal limits should not be eligible for reduced monitoring. Seasonally tiered limits already reflect relief from an annual limit.

2) To qualify for consideration of reduced monitoring requirements, the facility should not have been issued three or more Warning Letters, two or more NOVs, or be under any Consent Orders, Consent Decrees, or related enforcement actions during the past three years.

3) If the facility has received fewer than three Warning Letters or two NOVs during the past three years, reduced monitoring can be considered only for parameters that did not incur effluent violations specified in WLs or NOVs.

4) If the facility has received a Warning Letter or NOV for effluent violations of a WET limit during the past two years, it should not be considered for reduced monitoring.

5) If a facility has multiple and independent outfalls, and one outfall was subject to compliance or enforcement action(s), the rest of the outfalls are not eligible for reduced monitoring.

6) Parameters sampled once per month or less frequently should not be considered for additional monitoring reductions.

7) If any part of the sewerage system, including collection lines owned by a third party, has been subject to multiple compliance or enforcement actions (more than two, including WLs) in the past three years, the facility is not eligible for reduced monitoring.

8) If an upgraded facility replaces a facility that was under an enforcement action, the new facility can be considered for monitoring reduction after it produces three years of effluent data.

9) If the facility has had other operational excursions such as exceeding the 95% flow level, but has not yet been issued an enforcement action, it can still qualify for monitoring reduction.

b. Calculation of Monitoring Reductions

For each eligible parameter, calculate the three-year composite average of representative data at each outfall. For a POTW that has just added large significant industrial users or new development, data before the new connections may no longer be representative of the facility's effluent. In this case, three years of data after the user connects would need to be assessed before reduced monitoring could be considered. In the same manner, a significant user may have closed two years ago and only the last two years of data are representative. Permit writers should avoid using long periods of record to reduce or increase the value of the past four years of effluent data. (Note: D.O., pH, temperature and bacteria are evaluated differently, as described at the end of this section). The ratio of the composite long-term average divided by the permit limit (X100), and the resulting percentage provides the potential monitoring frequency reduction.

Monitoring Frequency "Floor": Current federal NPDES regulations do not establish a monitoring frequency "floor" but do establish a reporting frequency floor of once per year. The monitoring frequency from which reductions could be made in this manual is considered to be the level of the monitoring in the existing effective VPDES permit. It is important to recognize that the EPA guidance from which Table 1 was taken asserts that there is no loss of statistical confidence in determining whether a permit limit is being violated at reduced monitoring frequencies. Also, the EPA guidance does not advocate for any reductions for parameters that are currently monitored only once per quarter.

It is important to recognize that permittees who receive monitoring frequency reductions are still expected to take all appropriate measures to control both the average level of pollutants of concern in their discharge (mean) as well as the variability of such parameters in the discharge (variance), regardless of any reductions in monitoring frequencies granted from the baseline levels.

Monitoring Frequency Reduction Based on Actual Performance Percentage of Permit Limit

Ratio of Composite Long-Term Average to Monthly Average Limit X 100

Baseline Monitoring Frequency	75-66%	65-50%	49-25%	<25%
7/wk	5/wk	4/wk	3/wk	1/wk
6/wk	4/wk	3/wk	2/wk	1/wk
5/wk	4/wk	3/wk	2/wk	1/wk
4/wk	3/wk	2/wk	1/wk	1/wk
3/wk	3/wk	2/wk	1/wk	1/wk
2/wk	2/wk	1/wk	2/mo	1/mo
1/wk	1/wk	1/wk	2/mo	1/2mo

1) New permittees and upgraded treatment facilities should generate three years of data before being eligible for consideration for reduced monitoring. Existing permittees' data submitted during the permit term should be evaluated at permit reissuance to determine if the level of reduced monitoring is still appropriate.

2) Facilities which satisfy the qualification criteria but are not experiencing discharges of 75% or less of their permitted levels of water quality-based parameters should not be eligible for reductions in monitoring/reporting frequencies.

3) Dissolved Oxygen: Where the post-aeration system is passive (i.e., cascade steps), reduction of monitoring frequency can be considered on a case-by-case basis. Reduced monitoring should not be allowed when minimum or average D.O.s fall within 0.5 mg/L or 1.0 mg/L, respectively, of the permit limit.

4) pH: Where pH is not directly adjusted by chemical addition, reduction of monitoring frequency can be considered on a case-by-case basis. Reduced monitoring should not be allowed where minimum or maximum pHs fall within 0.5 units of the permit limits.

5) Temperature: Reduction of monitoring frequency may be considered on a case-by-case basis.

6) Bacteria: Reduction of monitoring frequency when using chlorine disinfection can be considered on a case-by-case basis (i.e. if the chlorine contact tank is designed in accordance with the SCAT regulation and operating correctly) but not less than

4 weekly samples in one calendar month per quarter for majors and not less than 4 weekly samples in one calendar month per year or one sample quarterly (single sample maximum NOT geometric mean) for minors. Chlorine contact tank monitoring cannot be reduced.

All bacteria sampling should be conducted between the hours of 10:00 a.m. and 4:00 p.m.

Example Reduced Monitoring Schedule for Bacteria

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Major			4 Weekly Samples Quarterly			4 weekly samples Quarterly			4 weekly samples Quarterly			4 weekly samples Quarterly
Minor Reduced Monitoring Scenario #1			Quarterly Use Single Sample Max as Limit Not Geometric Mean			Quarterly Use Single Sample Max as Limit Not Geometric Mean			Quarterly Use Single Sample Max as Limit Not Geometric Mean			Quarterly Use Single Sample Max as Limit Not Geometric Mean
Minor Reduced Monitoring Scenario #2	4 Weekly Samples/month annually (Any month during the year)											

Monitoring reductions for bacteria for facilities using alternate disinfection (everything except chlorination) may be granted on a case-by-case basis in non-PWS and non-shellfish waters depending on past performance and if the UV system utilizes dose pacing with appropriate alarms and redundancies to provide assurance that the design dose, and subsequent disinfection, is being achieved. The O & M Manual should be modified to include a schedule for recording pertinent UV operational data. All reduced monitoring for alternate disinfection should be coordinated with Central Office (Erica Duncan) and documented in the Fact Sheet.

The permit writer should obtain the following information from the permittee or DEQ records:

1. Does the facility UV system use dose pacing with appropriate alarms?
2. Does the facility have any of the following alarms: failure to achieve dose alarm, high/low flow alarm, low UV intensity alarm, transmittance alarm, and flow out of range alarms? Monitoring and recording (e.g., SCADA) may be considered.
3. Does the facility have any performance issues or concerns with the UV treatment system?
4. How often is the facility UV system maintained?
5. Does the facility have an O&M protocol in place for the UV system?

c. Reinstating Higher Monitoring:

Permittees are expected to maintain high performance levels after being granted reduced monitoring. If the permittee receives notices of violation related to any of the

effluent limitations for which reduced monitoring was granted, reinstate the baseline frequencies for all parameters that previously had reduced monitoring.

d. Special Considerations:

1) **Discontinuous data:** Monitoring cannot be reduced using the methodology described above if effluent data have not been continuously reported over the period of time being considered. Effluent averages from interrupted or discontinuous data sets may not be representative of long-term performance. Monitoring frequencies for discharges that are intermittent or short-term, such as seasonal discharges, and highly variable batch processes cannot be assessed or reduced using the methods described in these procedures.

2) **Exceptions:** It may be appropriate to maintain higher monitoring levels in individual situations where there may be a particular interest in human health, endangered species, or a sensitive aquatic environment. An example would be a water body that has water quality problems and it has been determined which point and nonpoint sources are particularly critical from the standpoint of protection of aquatic resources (e.g., endangered species) or human health (e.g., drinking water source). Discharges that involve addition of chemicals such as polymers for flocculation may change character rapidly and might not continue to reflect the quality demonstrated in earlier monitoring. The permit writer may decide not to reduce monitoring of critical point sources in these instances. The permit writer should always apply Professional Judgement in setting monitoring frequencies.

3) **Limits below Levels of Detection**: We do not recommend reductions in monitoring frequencies in cases where stringent water-quality based effluent limits (WQBELs) are below levels of quantitation (e.g., TRC) (the level at which a constituent present in a wastewater sample can be reliably detected and quantified). Permittees with these types of limits will normally be deemed to be in compliance when monitored levels are below the level of quantitation; however, by definition, it is not scientifically possible (until analytical methods improve) to certify that the WQBELs are actually being achieved. Thus, DEQ feels it would be inappropriate to develop procedures recommending reductions from established monitoring frequencies for these types of limits.

4) **Use of Daily Maximum Values**: These procedures do not provide a specific methodology for considering daily maximum permit values when considering monitoring/reporting reductions. Consider such situations on a case-by-case basis. There may be concerns over instances where, for example, there are acutely toxic conditions in a receiving water due to violations of daily maximum permit limitations. In such cases, higher monitoring frequencies may be required. In addition, it is important to recognize that dischargers who frequently violate daily maximum permit limitations will likely be unable to achieve high levels of performance in monthly average limits and effectively would not be eligible to participate in this program on that basis. In addition, such facilities may also trigger enforcement criteria.

5) **Water Reclamation and Reuse**: If a VPDES permitted municipal WWTF will also be authorized to do water reclamation reuse, reclaimed water produced by the WWTF may be eligible for limited monitoring reductions at reissuance depending on (i) the type of reclaimed water to be produced (e.g., Level 1 or Level 2), or (ii) the relationship of the reclamation system to the WWTF that provides source to the reclamation system. For example, the reclamation system and WWTF may be

one in the same with no difference in treatment (referred to as a conjunctive system), the reclamation system may share one more unit treatment processes with the WWTF but provides other additional treatment independent of the WWTF, or the reclamation system does not shares any unit treatment processes with the WWTF (referred to as an independent system).

There are no provisions to allow monitoring reductions for most reclaimed water standards in 9VAC25-740-10 et seq. with the exception of bacterial sampling frequency reductions for Level 1 reclaimed water specified in 9VAC25-740-80.A.4 and established per Subdivision III.G.6.d (1) of GM 10-2001, Rev. 1 (9/10/18). Because the procedures in the current guidance to evaluate bacteria monitoring frequency reductions did not go into effect until 9/10/18, similar monitoring frequency reductions for Level 1 reclaimed water granted prior to 9/10/18 should remain valid unless there is cause, such as but not limited to, compliance and enforcement issues related to the reclamation system, to warrant re-evaluation. Bacteria sampling frequency reductions requested after 9/10/18 must be evaluated per Subdivision III.G.6.d (1) of GM 10-2001, Rev. 1 and cannot go below the minimum frequency specified in 9VAC25-740-80.A.4.a.

For a VPDES permitted reclamation systems that will produce Level 2 reclaimed water, partially or completely independent of the WWTF that will provide source water to the reclamation system, there are procedures to allow only *bacteria* monitoring waivers for the Level 2 reclaimed water in Subdivision III.G.6.d (2) of GM 10-2001, Rev. 1.

For a VPDES permitted conjunctive system that will produce Level 2 reclaimed water and provide the same treatment to both the effluent and the reclaimed water, monitoring frequency reductions determined according to this section (MN-1) of the VPDES Permit Manual for the effluent may also be applied to the Level 2 reclaimed water for the same monitoring parameters. This is based on the fact that there is no difference between the treatment, composition and character of the effluent and the Level 2 reclaimed water, and neither are intended for public contact.

For a VPDES permitted conjunctive system that will produce Level 1 reclaimed water and provide the same treatment to both the effluent and the reclaimed water, most monitoring for the reclaimed water, excluding bacterial sampling frequency, cannot be reduced for reuses listed in 9VAC25-740-90.A of that water.

For a VPDES permitted conjunctive system that will reclaim wastewater (municipal or industrial) for unlisted reuses that are approved on a case-by-case basis in accordance with 9VAC25-740-90.B or C, and the reclaimed water produced by the conjunctive system must comply with Level 1 reclaimed water standards and monitoring requirements, or other standards and monitoring requirements developed in accordance with 9VAC25-740-70.D and E; the RO may allow monitoring reductions for the reclaimed water, excluding bacterial sampling frequency for Level 1 reclaimed water, where the RO in consultation with VDH has determined that a monitoring reduction of one or more reclaimed water standards will not increase the risk of the proposed reuse to public health and the environment. Where the conjunctive system, in this case, will have Level 1 bacteria standards and monitoring requirements, bacterial sampling frequency reductions must be evaluated per Subdivision III.G.6.d (1) of GM 10-2001, Rev. 1 and cannot go below the minimum frequency specified in 9VAC25-740-80.A.4.a.

6. Reporting

The results of Part I.A monitoring are reported on the DMR. DMRs are submitted via myDEQ Portal by the 10th of each month for reporting the previous month's monitoring activities. Reports of monitoring required by special conditions may be submitted as separate documents.

B. Secondary Treatment Standards

1. Influent Monitoring, Percent Removal, and Effluent Limitations

For municipal treatment facilities, 40 CFR Part 133 specifies technology-based limits for the minimum level of treatment that must be met through the application of secondary treatment. Exhibit MN-1 below summarizes the standards:

Exhibit MN-1 Secondary Treatment Standards

Parameter	30-day average	7-day average
BOD_5	30 mg/L (or 25 mg/L $CBOD_5$)	45 mg/L (or 40 mg/L $CBOD_5$)
TSS	30 mg/L	45 mg/L
BOD_5 and TSS removal (concentration)	85% (min)	--
pH	Within the limits of 6.0-9.0 S.U.	

Exhibit MN-2 summarizes influent monitoring and percent removal secondary treatment standards for all municipal plants:

Exhibit MN-2 Influent Monitoring and Percent Removal

	BOD_5, $CBOD_5$ and TSS Influent	BOD_5, $CBOD_5$ and TSS % Removal
Parameter Codes	625 TSS, Influent 354 BOD_5, Influent 892 $CBOD_5$, Influent	064 TSS, Percent Removal 979 BOD_5, Percent Removal 980 $CBOD_5$, Percent Removal
Sample Frequency	Same as effluent	Same as reporting frequency
Sample Type	Grab	CALC
Conc Avg Stat	Monthly Average	NA
Conc Min Stat	NA	Monthly Average Minimum
Limit (Conc Ave)	NL	NA
Limit (Conc Min)	NA	85
Units	mg/L	%
Reporting Frequency	Annual, Semi-Annual, or Quarterly	Annual, Semi-Annual, or Quarterly
Monitoring Location	Raw Sewage Influent	Percent Removal

Based on the facility's design flow, the following influent monitoring frequencies apply:

Design Flow	Reporting Frequency
≥ 1.0 MGD	1 per Quarter
0.0401 – 0.999 MGD	1 per 6 Months
0.0011 – 0.040 MGD	1 per Year

> Regardless of design flow the permit may include annual reporting for (1) any corresponding BOD_5, $CBOD_5$ or TSS limit of 10 mg/L or less; (2) any facility with a technology-based TN of 8 mg/L or less or a technology-based TP limit of 1 mg/L or less; and (3) any facility with effluent filters or other forms of tertiary treatment. In no case shall the monitoring frequency be less than 1 month/year. For seasonal BOD_5 and TSS, the month(s) that the percent removal requirement is calculated will be compared to the seasonal requirement effective during that month.

Influent and effluent samples are not required to be collected on the same day; however, they are required to be collected at the sampling frequency specified in the permit. § 133.101.(k) defines "Percent removal" as "A percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the 30-day average values of the raw wastewater influent pollutant concentrations to the facility and the 30-day average values of the effluent pollutant concentrations for a given time period."
The permittee must average all influent data, then all effluent data, and calculate the percentage removal. Please note that the sampling frequency varies (e.g.3d/week once per month annually), however, the reporting frequency is either quarterly, semi-annual, or annual.

If the permittee collects additional influent samples in accordance with Part II.A of the permit, they would use all influent data for each month and calculate the percent removal for that month and report the lowest percent removal for that reporting period (quarterly, semi-annual, or annual). For example, in the case of annual reporting, if influent data was collected in March and July, the permittee would calculate the percent removal for each month (since they have influent and effluent data), then report the minimum percent removal on the DMR that is due on January 10th for that annual reporting period. The permittee may also include comments in the DMR Comment field to provide necessary clarifications as needed.

CEDS Entry

Exhibit MN-3 summarizes CEDS entry rules for the incorporation of the monitoring and reporting requirements in the VPDES permits.

Exhibit MN-3 CEDS Entry Rules

	BOD_5, $CBOD_5$ and TSS Influent	**BOD_5, $CBOD_5$ and TSS Percent Removal**
Parameter Codes	625 TSS, Influent 354 BOD_5, Influent 892 $CBOD_5$, Influent	064 TSS, PERCENT REMOVAL. 979 BOD_5, PERCENT REMOVAL 980 $CBOD_5$, PERCENT REMOVAL
Sample Frequency	Same as effluent	Same as reporting frequency
Sample Type	Grab	CALC
Conc Avg Stat	MONTHLY AVERAGE	MONTHLY AVERAGE MINIMUM
Limit	NL	85
Units	mg/L	%
Reporting Frequency	1 PER YEAR, 1 PER 6 MONTHS, 1 PER QUARTER	1 PER YEAR, 1 PER 6 MONTHS, 1 PER QUARTER
Monitoring Location	Raw Sewage Influent	Percent Removal

C. Equivalent to Secondary Standards

1. Influent Monitoring, Percent Removal, and Effluent Limitations

Some biological treatment technologies, such as trickling filters or waste stabilization ponds, are capable of achieving significant reductions in BOD_5 and TSS but might not consistently achieve the secondary treatment standards for these parameters.

The equivalent to secondary treatment standards, as specified in § 133.105 are shown in Exhibit MN-4 below.

Exhibit MN-4 Equivalent to Secondary Treatment Standards

Parameter	30-day average	7-day average
BOD_5	Not to exceed 45 mg/L (or not to exceed 40 mg/L $CBOD_{5)}$	Not to exceed 65 mg/L (or not to exceed 60 mg/L $CBOD_{5)}$
TSS	Not to exceed 45 mg/L	Not to exceed 65 mg/L
BOD_5 and TSS removal (concentration)	Not less than 65% (min)	--
pH	Within the limits of 6.0-9.0 S.U.	

To be eligible for discharge limitations based on equivalent to secondary standards, a POTW must meet ***all three*** of the following criteria:

a. Criterion #1 - Consistently Exceeds Secondary Treatment Standards: The first criterion that must be satisfied to qualify for the equivalent to secondary standards is demonstrating that the BOD5 and TSS effluent concentrations consistently achievable through proper operation and maintenance of the treatment works exceed the secondary treatment standards set forth in §§ 133.102(a) and (b). The regulations at § 133.101(f) define *"effluent concentrations consistently achievable through proper operation and maintenance"* as

   1) (f)(1): For a given pollutant parameter, the 95th percentile value for the 30-day average effluent quality achieved by a treatment works in a period of at least 2 years, excluding values attributable to upsets, bypasses, operational errors, or other unusual conditions.

   2) (f)(2): A 7-day average value equal to 1.5 times the value derived under paragraph (f)(1).

      Some facilities might meet this criterion only for the BOD_5 limitations or only for the TSS limitations. EPA believes that it is acceptable for the permit writer to adjust the limitations for only one parameter (BOD_5 or TSS) if the effluent concentration of only one of the parameters is demonstrated to consistently exceed the secondary treatment standards.

b. Criterion #2 - Principal Treatment Process: The second criterion that a facility must meet to be eligible for equivalent to secondary standards is that its principal treatment process must be a trickling filter or waste stabilization pond (i.e., the largest percentage of BOD and TSS removal is from a trickling filter or waste stabilization pond system).

c. Criterion #3 - Provides Significant Biological Treatment: The third criterion for applying equivalent to secondary standards is that the treatment works provides significant biological treatment of municipal wastewater. The regulations at § 133.101(k) define significant biological treatment as using an aerobic or anaerobic biological treatment process in a treatment works to consistently achieve a 30-day average of at least 65 percent removal of BOD5.

2. Adjustments to Equivalent to Secondary Standards

In addition to providing secondary treatment standards and equivalent to secondary treatment standards, the federal regulations allow states to make adjustments to the standards and to apply those adjusted standards on a case-by-case basis.

a) Adjusted TSS Requirements for Waste Stabilization Ponds

In accordance with regulations adopted by EPA in 1977 and revised in 1984, states can adjust the maximum allowable TSS concentration for waste stabilization ponds upward from those specified in the equivalent to secondary treatment standards to conform to TSS concentrations achievable with waste stabilization ponds. The regulation, found at § 133.103(c), defines "SS concentrations achievable with waste stabilization ponds" as the effluent concentration achieved 90 percent of the time within a state or appropriate contiguous geographical area by waste stabilization ponds that are achieving the levels of effluent quality for BOD5 specified in § 133.105(a)(1) (45 milligrams per liter [mg/L] as a 30-day average). To qualify for an adjustment up to as high as the maximum concentration allowed, a facility must use a waste stabilization pond as its principal process for secondary treatment and its operations and maintenance data must indicate that it cannot achieve the equivalent to secondary standards.

To comply with the Revised Secondary Treatment Regulation for Equivalent to Secondary Treatment and the flow chart on page 13 of Section III, apply TSS limitations as follows:

TSS limitations for waste stabilization ponds can be 60 mg/l or 78 mg/l monthly average depending on the outfall location.

Outfalls Located	Permit Limitation
East of Blue Ridge Mountains	60 mg/L monthly average
West of Blue Ridge Mountains	78 mg/L monthly average
Eastern slope counties Loudoun, Fauquier, Rappahannock, Madison, Greene, Albemarle, Nelson, Amherst, Bedford, Franklin, and Patrick	Case by case application of 60 mg/L or 78 mg/L limits

3. Flow Chart: Equivalent to Secondary Treatment Standards

The flow chart in this section is to be used to determine permit limits for existing facilities under the Secondary Treatment Regulation discussion of equivalent to secondary treatment (40 CFR 133.105). Equivalent to secondary treatment only applies to sewage treatment plants and specifically trickling filters and waste stabilization ponds (facultative basins without supplemental aeration). See Section III for more information.

The flow chart is broken into three organizational structures:

a. Can the facility meet conventional secondary treatment limits?
b. Are there any special considerations to be addressed in order to set treatment limits?
c. Does the facility qualify for equivalent to secondary treatment?

The permit writer should encourage the continued use of existing trickling filters and waste stabilization ponds where appropriate, through the application of appropriate equivalent to secondary limits. However, the permit writer must be sure that these facilities are capable of meeting the proposed effluent limits without causing water quality impacts before the permit limits can be adjusted. If one cannot determine this, equivalent to secondary limits cannot be used in the permit.

A yes/no decision question and statement system has been devised in the form of a flow chart so that various facility conditions can be worked through. By answering questions or following directive statements the chart will indicate the appropriate permit decisions. To illustrate how the flow chart works see the following examples.

Example 1

A .060 MGD waste stabilization pond is consistently maintaining a treatment quality of 40 mg/l-BOD and 60 mg/l-TSS. The high BOD and TSS is a result of the facility's receipt of a .010 MGD industrial discharge. Investigation of the applicable industrial category reveals that BCT, BPT, or a new source (whichever is applicable) limits for the industry would be less stringent than conventional secondary treatment limits or equivalent to secondary limits if the industry was a direct discharger.

a. Referring to the chart on page 16 of Section MN-1, the starting point is "Permit Reissuance or Modification for Existing Facilities". Moving through the boxed decision questions the first question is, "Can the facility meet conventional secondary limits?". Reviewing the given data of 40 mg/l-BOD and 60 mg/l-TSS the answer to this question is "no".

b. Moving in the "no" direction the next box asks the question, "Is the inability of the facility to meet its 30-day average requirements for BOD, CBOD and/or TSS due to the receipt of an industrial discharge?". Again, reviewing the given data, the facility receives an industrial discharge and thus the answer to this question is "yes".

c. In the "yes" direction the next question is listed under the heading "special considerations". This question asks, "Would the effluent limits (BOD, CBOD, TSS) given to the industry under the Act be less stringent than secondary or equivalent to secondary limits if the industrial category discharged directly to a receiving stream?". Since limits for the industry as a direct discharger are less stringent than secondary treatment limits or equivalent to secondary treatment limits, the answer to this question is "yes".

d. Again, moving in the "yes" direction, the next question is "Does the flow or loading of the discharge, attributed to the industrial category exceed 10 percent of the design flow or loading of the publicly owned treatment works?". Since the industrial discharge rate (.010 MGD) is 16 percent of the waste stabilization pond design flow of .060, the answer is "Yes".

e. Moving again in the "yes" direction the next box makes the statement, "Adjust applicable limits proportionately. (Make assurances for water quality standards)". After this is completed, the permit processing should proceed.

Example 2

A .060 MGD waste stabilization pond maintaining a treatment quality of 40 mg/l-BOD and 60 mg/l-TSS. No industrial discharge is received by the locality.

a. Starting at the top of the flow chart, the answer to the first question is "no" since the facility consistently reported data of 40 mg/l-BOD, 60 mg/l-TSS and does not meet conventional secondary limits.

b. The answer to the second question is also "no" since the facility does not receive an industrial discharge.

c. Moving in the "no" direction the answer to the question "Is the facility a waste stabilization pond?" is "yes" due to the fact that the facility is a waste stabilization pond.

d. Assume for the next question that the waste stabilization pond is the principal treatment process. As such, the answer to the question is "yes".

e. Moving in the "yes" direction ask the next question "Does the data indicate that the TSS values of 30-day < 45 mg/l, 7-day < 65 mg/l, and 30-day average percent removal 65 percent cannot be achieved?". For this example, the given facility information states the reported value of 60 mg/l-TSS. Thus the 45 mg/l-TSS cannot be achieved and the answer to the question is "yes".

f. Moving in the "yes" direction the next box assigns appropriate TSS limits of 60 mg/l or 78 mg/l. The decision of which limits to use rests with the permit writer. The next box asks the question, "Is BOD > 30 mg/l?". The reported value for BOD is 40 mg/l. Since the value is > 30 mg/l the answer to the question is "yes".

g. The statement in the next box reads, "Go to equivalent to secondary limitations". Without the use of an arrow move to the first box located under the heading "EQUIV. TO SECONDARY".

h. The first question in this section asks, "Is a trickling filter or waste stabilization pond used as the principal process?". The answer is "yes".

i. The second question asks, "For BOD and/or TSS, does the 95th percentile value for the monthly average effluent quality achieved in a period of at least two years exceed 30 mg/l?". Since the values for TSS have already been dealt with in the example, this question is dealing only with BOD. Reviewing the given data, the BOD value is 40 mg/l. Since 40 mg/l-BOD is greater than 30 mg/l, the answer to the question is "yes".

j. Moving in the "yes" direction the next question asks, "Do these values represent at least 65 percent removal of BOD on a constant basis?". For the purposes of this example the answer to this question is "yes".

k. The next question is a loop designed to make sure water quality standards are met. To do this, check the facility file for calculations relating to the wasteload allocation plan and/or 303(e)/208 plans. These should have been done in the original issuance of the permit.

l. Once this part is completed and the answer to the original statement is "yes", move in the "yes" direction. The next statement is an anti-backsliding statement. It is designed for those facilities which can maintain effluent quality better than allowable limits for equivalent to secondary yet cannot meet conventional secondary limits. Specifically, if a facility is capable of meeting 40 mg/l-BOD and 40 mg/l-TSS on a consistent basis, the permit would reflect those limits rather than 45 mg/l-BOD, 45 mg/l-TSS as defined by equivalent to secondary. If this statement does not apply, move to the next box where equivalent to secondary limits are listed.

m. When setting permit limits, take into consideration any waste stabilization pond or trickling filter systems where significant geographical, climatic, or seasonal factors can cause significant differences in reporting during the year. In instances such as these, tiered limits should be set to reflect such differences. After the permit limits have been determined, continue with the issuance process.

Example 3

A .060 MGD waste stabilization pond maintaining a treatment of 40 mg/L-BOD and 29 mg/L-TSS. No industrial discharge is received by this facility.

a. Again, starting at the top of the flow chart the first question asks, "Can the facility meet conventional secondary limits?". A review of the given data shows 40 mg/L-BOD and 29 mg/L-TSS. Since 29 mg/L-TSS already meets conventional secondary limits, set the limits at 30 mg/L-TSS. The data stated 40 mg/L-BOD is greater than the 30 mg/l-BOD required for conventional secondary limits and the answer for this part is "no".

b. Continue with 40 mg/L-BOD to the next question. The facility does not receive an industrial discharge and thus the answer to this question is "no".

c. Since the facility is a waste stabilization pond, the answer to the next question is "yes".

d. From here, assume that the waste stabilization pond is the principal process used for secondary treatment, then the answer to the next question will also be "yes".

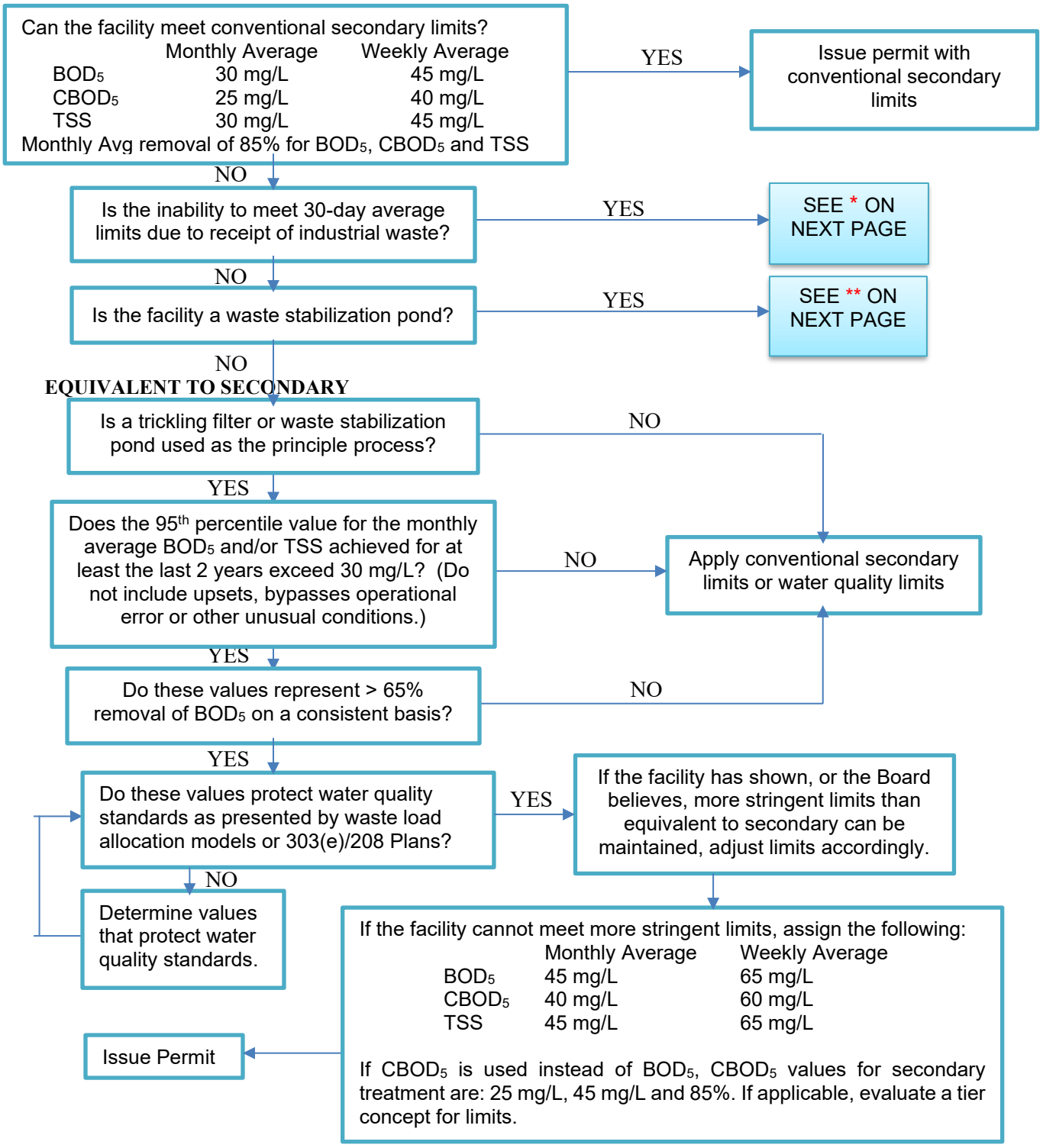
e. Moving in the "yes" direction the next question concerns TSS. Since limits for 30 mg/l were assigned earlier in the flow chart, there is no need to consider this question and a "no" answer is sufficient.

f. In the "no" direction the next question asks, "Is BOD > 30 mg/L?" The stated BOD of 40 mg/L is greater than 30 mg/L and the answer is "yes". Continuing in the "yes" direction the next box states, "go to equivalent to secondary limitations".

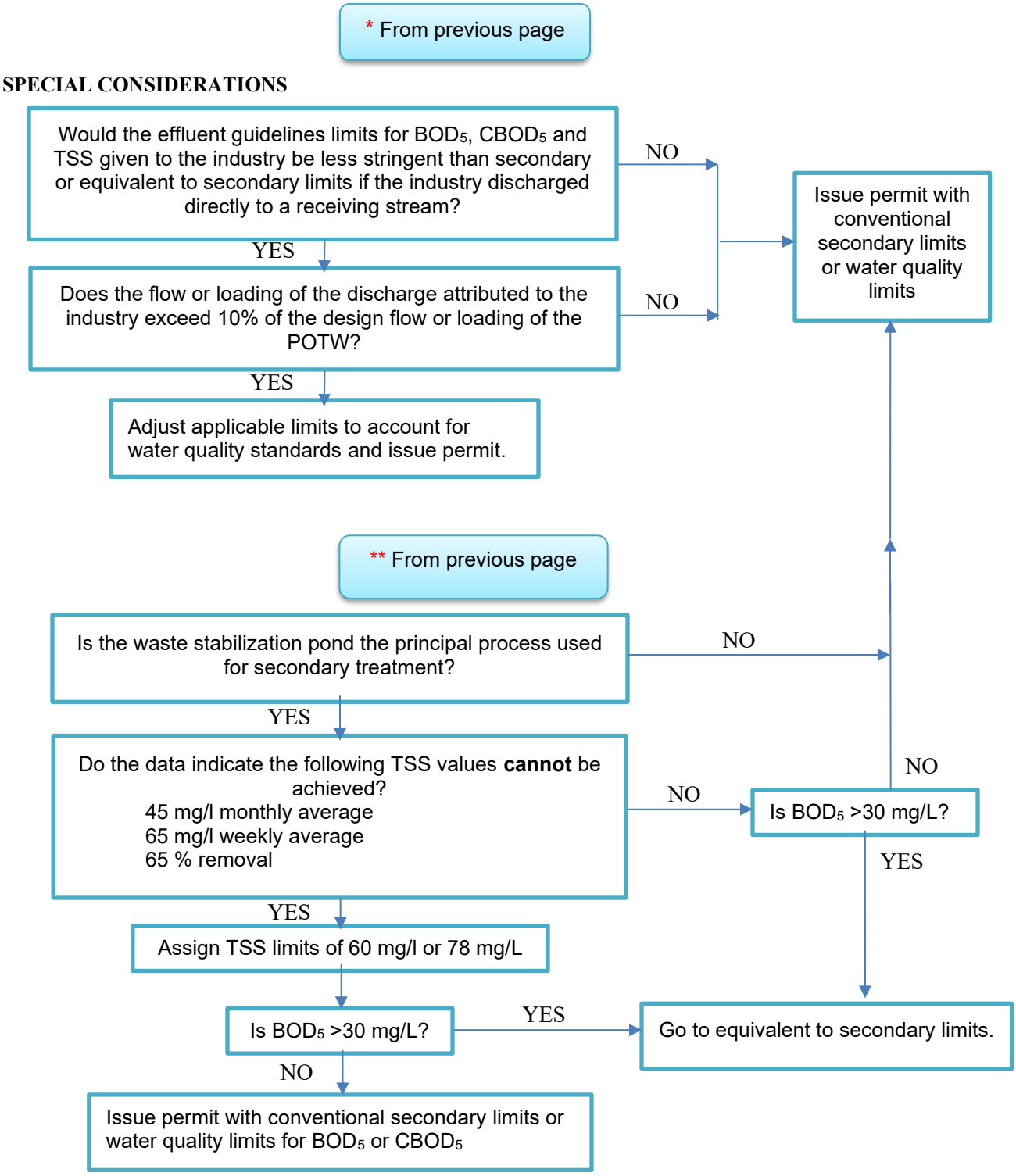
g. As in Example 2, move to the first box located under the heading "EQUIVALENT TO SECONDARY'. Since the data 40 mg/L-BOD is the same as that in Example 2, refer to the corresponding point in Example 2 and determine the BOD limits by completing the flow chart.

h. As before, once appropriate limits are determined, continue to process the permit.

PERMIT FOR REISSUANCE OR MODIFICATION FOR EXISTING FACILITY



Flow Chart: Equivalent to Secondary Treatment Regulation (cont'd)



D. Adjustments to Concentration Limits

Part 133 allows a permit writer to make further adjustments when calculating effluent limitations derived from secondary treatment standards or equivalent to secondary standards based on several special considerations. The permit writer should determine whether any of the special considerations outlined in this section apply and, as appropriate, make any further adjustments to the concentration limitations or percent removal requirements. The calculated limitations, after making such adjustments, are the final technology-based effluent limitations for the POTW.

1. Substitutions of $CBOD_5$ for BOD_5

In 1984, EPA promulgated rule revisions allowing for the substitution of $CBOD_5$ for BOD_5 when implementing federal secondary and equivalent to secondary standards. The federal register promulgating these rule revisions[1] explained the rationale for the changes:

"The Agency is allowing substitution of the $CBOD_5$ parameter for the BOD_5 parameter, because it believes that this parameter is a better reflection of the understood meaning of secondary treatment in terms of measuring the removal of carbonaceous organic materials by secondary treatment for certain POTWs. In addition, the Agency believes that implementation of $CBOD_5$ test procedures should eliminate the counter-productive operating practices that were noted above since incidental nitrification will no longer affect test results."

The rule revisions pertain to the implementation of both secondary standards for BOD_5, and equivalent to secondary standards for BOD_5. These rules and their implementation are discussed in more detail below.

Wastewater contains carbonaceous oxygen demanding substances and nitrogenous oxygen demanding substances. A $CBOD_5$ test measures the 5-day carbonaceous biochemical oxygen demand while the BOD_5 test measures both carbonaceous biochemical oxygen demand and nitrogenous biochemical oxygen demand. During nitrification, nitrifying bacteria use a large amount of oxygen to consume nitrogenous oxygen demanding substances (unoxidized nitrogen and ammonia-nitrogen) and convert these to oxidized nitrate.

EPA recognizes that the $CBOD_5$ test can provide accurate information on treatment plant performance in many cases and, in Part 133, allows permit writers to use $CBOD_5$ limitations in place of BOD_5 limitations to minimize false indications of poor facility performance as a result of nitrogenous oxygen demand.

Please contact the Office of VPDES Permit if substitutions are requested for water-quality based BOD_5/$CBOD_5$ effluent limitations.

While federal regulations do not specifically address the substitution of CBOD for BOD when establishing permit limits, DEQ believes that it is appropriate to do so due to the same rationale presented by EPA when developing their rule allowing the substitution.

a. Secondary Standards

Under federal regulations a permit writer may substitute $CBOD_5$ for BOD_5 when applying federal secondary standards. This substitution should take place if a permittee requests the substitution. The monitoring requirements included in permits to determine compliance with the $CBOD_5$ limits must be for $CBOD_5$ in order to conform

[1] Federal Register/Vol.49, No. 184/Sept. 20, 1984

to federal and state requirements. This substitution may be applied seasonally or year-round.

The federal regulations state that the resulting $CBOD_5$ limits may not be less stringent than the following:

25 mg/L as a 30-day average
40 mg/L as a 7-day average

b. Equivalent to Secondary Standards

Federal regulations and guidance also allow permit writers to substitute $CBOD_5$ for BOD_5 when applying federal equivalent to secondary standards. However, the applicable regulation (40 CFR 133.102) only allows this substitution "(w)here data are available to establish CBOD5 limitations …".

In order to substitute $CBOD_5$ for BOD_5 when applying federal equivalent to secondary standards, the permittee should request the substitution, and submit parallel $CBOD_5$ and BOD_5 effluent data. The data should be collected during periods of cool weather and while the facility is achieving at least the 45 mg/L (monthly average), 65 mg/L (weekly average), and 85% removal (monthly average) BOD_5 limits[2]. The permit writer will analyze the data to determine the relationship between the $CBOD_5$ and BOD_5 data and develop a conversion factor to be used to establish appropriate $CBOD_5$ limitations. The substitution may be applied seasonally or year-round. The permittee should provide a minimum of one year's worth of data. For influent monitoring/percent removal, the permittee should submit data collected throughout all seasons within a one-year period.

The federal regulations state that the resulting $CBOD_5$ limits may not be less stringent than the following:

No greater than 40 mg/L as a 30-day average.
No greater than 60 mg/L as a 7-day average.

c. Implementation

When including technology-based $CBOD_5$ limits, the use of a $CBOD_5/BOD_5$ conversation factor is necessary when a permit currently contains BOD5 limits to implement the design criteria and the permittee requests the substitution of CBOD5 limits. The two options for calculating and assigning a conversion factor are:

1) Default Conversation Factor ($CBOD_5$:BOD_5): Based on the ratios of the $CBOD_5$ to BOD_5 concentrations used in the implementation of federal secondary standards.
   a) 0.8 for the 30-day average limit, derived from the federal substitution relationship of 25 mg/L $CBOD_5$ to 30 mg/L BOD_5
   b) 0.9 for the 7-day average limit, derived from the Federal substitution relationship of 40 mg/L $CBOD_5$ to 45 mg/L BOD_5
2) Site-specific Conversion Factor: If the permit wishes a site-specific conversion factor to be utilized, a parallel monitoring study may be performed to quantify the $CBOD_5/BOD_5$ concentration relationship. The derivation of this conversion factor should generally follow the same process used by EPA for deriving the conversion factor related to the federal equivalent to secondary standards. This includes the

[2] These requirements are based on the data collection and analysis process EPA used to determine the CBOD5 limits for secondary standards. The process is explained in Federal Register/Vol.49, No. 184/Sept. 20, 1984, p.37000.

proposal and acceptance of a facility/outfall specific $CBOD_5$ limit with a future approved facility plan.

2. **Substitution of COD or TOC for BOD_5/$CBOD_5$** - Chemical oxygen demand (COD) and total organic carbon (TOC) laboratory tests can provide an accurate measure of the organic content of wastewater in a shorter time frame than a BOD_5 test (i.e., several hours versus five days). The regulations at § 133.104(b) allow a permit writer to set limitations for COD or TOC instead of BOD_5 if a long-term BOD_5:COD or BOD_5:TOC correlation has been demonstrated.

   While federal regulations do not explicitly address the substitution of COD for $CBOD_5$ when establishing permit limits, the EPA has confirmed its appropriateness. The permittee should provide a minimum of one year's worth of influent or effluent data (depending on whether the substitution is requested for influent or effluent monitoring). Once COD and BOD data have been collected over time, the average $CBOD_5$/BOD_5 result is divided by the average COD/TOC result to determine the ratio or conversion factor.. The COD/TOC results are then multiplied by this factor to estimate the BOD_5/$CBOD_5$ concentration. This substitution may be applied seasonally or year-round.

   > Prior to approving requests for the substitution of COD or TOC for BOD_5, please contact the Office of VPDES Permits.

   In order to approve a BOD_5/$CBOD_5$:COD or BOD_5/$CBOD_5$:TOC correlation ratio, the correlation study must demonstrate a statistically significant and a strong correlation exists between the two parameters.

   Please see Section 4.4.2 (pg. 148) of EPAs Handbook on Sampling and Sample Preservation of Water and Wastewater.

   If the request is approved, the permit should contain the following footnote in Part I.A of the permit:

   a. Influent monitoring:

      At least X% removal for [BOD_5/$CBOD_5$] and must be obtained for this effluent. Influent shall be sampled XXXX for one month [quarterly, semi-annually, annually]. See Part I.XX for additional requirements related to demonstration of secondary treatment. For [BOD_5/$CBOD_5$], percent removal may be based on either influent [BOD_5/$CBOD_5$] or influent [COD/TOC] data using the approved [BOD_5/$CBOD_5$]: [COD/TOC] ratio of XX, respectively. If the ratio is used, it is to be noted on the DMR for the monitoring period. The monthly average [BOD_5/$CBOD_5$] and TSS influent concentrations and percent removal shall be reported on the DMR by the 10th day of the month following sampling.

   b. Effluent monitoring:

      Effluent monitoring for [BOD_5/$CBOD_5$], may be based on either effluent [BOD_5/$CBOD_5$] or effluent [COD/TOC] data using the approved [BOD_5/$CBOD_5$]: [COD/TOC] ratio of XX, respectively. If the ratio is used, it is to be noted on the DMR for the monitoring period.

E. Plant Expansion/Upgrade Procedures

1. Permittee Requested Expansion of a Complying Facility

When the permittee requests a permit modification to allow for plant expansion, employ the following permitting procedure only if the facility is in compliance with its VPDES permit.

Issue the permit with an interim limitations page for the facility at the present design flow. Interim limits are Part I.A.1. The introductory language for Part I A 1 should read as follows:

A. INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the commencement of discharge from the ____ MGD facility or until the permit's expiration date, whichever occurs first, the permittee is authorized to discharge from outfall 001. This discharge shall be limited and monitored as specified below:

Include a final effluent limitations page for use when the project has been completed. Final limits are Part I.A.2. and are triggered either by commencement of discharge from the upgraded/expanded facility or issuance of a CTO (Choose one of the two below). Insert other outfalls and/or design flows as needed. The introductory language for Part I.A.2 should read as follows:

A. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

2. Upon the **[commencement of discharge from [or] issuance of a Certificate to Operate for]** the ___ MGD treatment facilities, the following effluent limitations and design flow shall become effective at outfall 001 and remain in effect until the permit's expiration date. This discharge shall be limited and monitored by the permittee as specified below:

2. Board Required Upgrade for a Non-Complying Facility

When a facility has been unable to meet existing effluent limitations, the permit should be written with the required limits effective immediately, without a compliance schedule. Any non-compliance issues should be referred to Enforcement. Any upgrade will be handled through an enforcement order.

Where limitations are being added for a parameter not previously limited or an existing limit is being made more stringent, the permittee should be provided a Schedule of Compliance to meet the new requirements. Interim limits are Part I.A.1. and should reflect limitations prior to the attainment of the new or more stringent limits. Final limits are Part I.A.2. and should reflect the upgraded requirements. Insert other outfalls and/or design flows as needed. In these cases, the introductory language for the interim and final limits pages should read as follows:

A. INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until **[commencement of discharge or issuance of a Certificate to Operate]** from the **[upgraded and/or expanded**] facility in accordance with the Schedule of Compliance in Part I.C., the permittee is authorized to discharge from outfall 001. This discharge shall be limited and monitored as specified below:

A. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

2. Upon **[commencement of discharge or issuance of a Certificate to Operate]** from the ____ MGD upgraded facility, the following effluent limitations shall become effective at outfall 001 and remain in effect until the permit's expiration date. This discharge shall be limited and monitored by the permittee as specified below:

3. Board Required Expansion/Upgrade for a Non-complying Facility

Where a facility is required to expand due to insufficient capacity and the facility has been issued an order to expand by Enforcement, upon reissuance the permit should be written to reflect the required limits effective immediately, without a compliance schedule. Any non-compliance issues should be referred to Enforcement. The expansion will be handled through an enforcement order.

Where a facility is required to expand due to insufficient capacity and the facility has NOT been issued an order to expand by Enforcement, include Part I pages with interim limits corresponding to the existing limitations and final limits reflecting the limitations of the expanded facility along with a Schedule of Compliance for the required expansion.

Where a facility is required to upgrade for new or more stringent limitations and the permittee requests a facility expansion, the effluent limitations pages should contain interim limits that correspond to the existing requirements of the permit, final limitations that reflect the required upgrade, and alternate final limitations that reflect the upgraded requirements along with the expansion. Insert other outfalls and/or design flows as needed. Permits for these upgraded plants that are in the process of expanding capacity should contain the Part I.A.1 Interim Limits and Part I.A.2 Final Limits language given above and the following final limits for the period between the upgrade and the completion of the expansion:

A. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. Upon commencement of discharge from the **[insert current design flow]** ___ MGD upgraded facility, the following effluent limitations shall become effective at outfall 001 and remain in effect until [**the issuance of a Certificate to Operate or commencement of discharge from the (insert expanded design rate) ____ MGD facility**] or until the permit's expiration date, whichever comes first. This discharge shall be limited and monitored by the permittee as specified below:

4. Schedule of Compliance for Required Expansion/Upgrade

See the OneDEQ VPDES Permit template for the special condition language.

5. Plant Expansion - Chlorine Pages

Chlorine permit pages may need to be modified to accommodate changes in flow due to plant expansion. The following chlorine language is provided for plant expansion. Only those portions of the chlorine special conditions that are subject to change are shown below. The rest of the chlorine language is to be written as presented earlier in this Section. For expansion situations needing alternative language other than described below, contact Office of VPDES Permits for assistance.

a. If dechlorination is required and plant expansion causes an increase in sampling frequency with no change in the detectable/nondetectable status, use the following format for #1 on the chlorine pages.

(1) Beginning with the permit's effective date and continuing until the commencement of discharge from the (**insert expanded flow rate**) facility, or until the permit's expiration date, whichever comes first, no more than [**10% of total no. of monthly samples***] of all samples for TRC taken after the chlorine contact tank and prior to dechlorination shall be less than [**1.0 or 1.5 mg/L****] for any one calendar month [CEDS Parameter Code #157]. The permittee shall monitor the TRC at the outlet of the chlorine contact tank prior to dechlorination [**1/___**] by grab sample.

a. Upon commencement of discharge from the [**insert expanded flow rate**] facility and continuing until the permit's expiration date, no more than [**10% of total no. of monthly samples***] of all samples for TRC taken after the chlorine contact tank and prior to dechlorination shall be less than [**1.0 or 1.5 mg/L****] for any one calendar month. [CEDS Parameter Code #157]. The permittee shall monitor the TRC at the outlet of the chlorine contact tank prior to dechlorination [**1/___**] by grab sample.

(2) No TRC sample collected prior to dechlorination shall be less than 0.6 mg/L. [CEDS Parameter Code #213]

(3) These TRC concentrations may be lowered where the permittee has demonstrated adequate disinfection.

* Number to be calculated and inserted by permit writer.
** 1.5 for PWS and shellfish waters, 1.0 for other waters.

b. If the expansion results in dechlorination being required and the final TRC/CPO levels change numerically but remain detectable, use the following format.

The hourly average concentration of TRC in the final effluent after dechlorination shall not exceed [**insert initial water quality-based number**] for the [**insert initial flow rate**] facility and [**insert expansion water quality-based number**] for the [**insert expanded flow rate**] facility.

c. If the expansion results in increased sampling frequency for bacteria, use the following format.

If an alternative to chlorination as a disinfection method is chosen, the bacteria parameter shall be limited and monitored by the permittee as specified below:

(1) For the [**insert current design flow**] flow facility:

E.coli / enterococci (*choose one)* [CEDS Parameter Code #120 or #140)] bacteria per 100 mL of water shall not exceed the following:

	Discharge Limitation	**Monitoring Requirements**	
	Monthly Average	**Frequency**	**Sample Type**
E. coli/Enterococci N/100 mL	126/35 (Geometric Mean)	XX	Grab
		Between 10 a.m. and 4 p.m.	

(2) For the [**insert expansion design flow**] flow facility:

E.coli / enterococci (*choose one)* bacteria per 100 mL of water shall not exceed the following:

	Discharge Limitation	Monitoring Requirements	
	Monthly Average	**Frequency**	**Sample Type**
E. coli/Enterococci N/100 mL	126/35 (Geometric Mean)	XX	Grab
		Between 10 a.m. and 4 p.m.	

d. Use an appropriately labeled separate and complete chlorine special condition for each flow tier.

6. Flow Used for Municipal Facility Limit Development

See Section H below**.**

F. Swamp and Marsh Waters

In a swamp environment, mixing is very limited. Due to the generally wide expanse of shallow, standing water, the effluent tends to displace ambient water so that initial mixing processes occur in an area where no significant dilution is available. There is very little turbulence and ambient mixing is mostly due to concentration gradients. Thus, it takes place very, very slowly.

Tidal marshes are periodically flooded at high tide but usually do not have standing water during the entire tidal cycle. Mixing in this situation is intermittent and complicated and is not amenable to analysis.

No mixing zones should be allowed in these situations unless the discharger provides actual physical/chemical data to demonstrate acceptable conditions. This means that the effluent itself should meet all applicable criteria prior to discharge. Due to the generally poor mixing and possibly high instream waste concentrations in portions of the receiving streams where these procedures will be applied, it is necessary that these "self-sustaining" effluent limits be utilized. TRC and other toxics should be treated as "end of pipe" limits.

In keeping with the preceding discussion, the following effluent limits for discharges from municipal treatment facilities into swamp and marsh waters where the discharge cannot be easily modeled are recommended. These limits have been found to be representative of "self-sustaining" effluents. In effect, this means that the effluent will not normally violate the stream standards even if the stream consists of 100% effluent.

Parameter	Monthly Average	Weekly Average
$CBOD_5$	10 mg/L	15 mg/L
TSS	10 mg/L	15 mg/L
TKN	3.0 mg/L	4.5 mg/L
D.O.	5.0 mg/L (minimum)	

These procedures were condensed from a March 9, 1987, SWCB memo entitled "Advisory Notification of Effluent Limits for Swamp and Marsh Waters". Contact Office of VPDES Permits for additional information concerning these limits if you have questions or concerns.

G. Certificates to Construct (CTC) and Certificates to Operate (CTO)

All CTCs and CTOs are processed by the regional offices. Grant funded projects do not have a separate procedure for CTC and CTO issuance. There are no wastewater engineering programs at DEQ to review preliminary engineering reports, plans, specifications, design documents or inspections of final projects. The water permit program managers must rely on the design engineer certification. Accordingly, we will not be asking for or receiving plans/specs for grant-funded projects for our review and processing.

On all projects, the application forms for either a CTCs or CTOs must be completed by the owner and the design engineer. The forms and instructions are on DEQ' website. These forms are then submitted to the water permit manager in the appropriate DEQ region. The form is reviewed for completion and sent to the regional permitting manager for approval and returned to the owner and design engineer. See section L for suggested transmittal letters for the forms.

H. Design Flow and Operational Flow

Position on Flow Used for Municipal Facility Limit Development

This position is intended to clarify the appropriate flow used in the development of permit limits for municipal wastewater treatment facilities (POTWs and PVOTWs), and expectations with regard to the use of flow tiers for these facilities.

Background

WPMs considered the topic of the appropriate flow tier(s) to be used in evaluating reasonable potential and establishing effluent limits for municipal wastewater treatment plants. Some facilities have actual flows that are substantially lower than their design flow. For example, a facility in NRO has asked for a lower flow tier to get relief on zinc limits (lower flow allows additional dilution). Their actual flows average approximately 0.09 MGD. The design flow is 0.9 MGD[3].

Standard agency practice and policy has been to use design flow. Of approximately 558 municipal permits in Virginia, all but 16 permits have used the design flow as a basis for evaluation. For those 16 facilities, "operational" flow tiers have been used in the reasonable potential evaluation and setting of effluent limits. Operational flow tiers are established at values lower than the facility design flow at levels requested by the permittee.

EPA has indicated that states have flexibility[4] to use design flow or other appropriate flows in setting water quality-based effluent limits for municipal facilities (81 FR 31356; May 18, 2016). As noted, DEQ has traditionally used design flow based on regulation (9VAC25-31-230 B; 40 CFR 122.45(b)(1)) and guidance[5] and for the reasons stated below.

Design flow is the applicability basis for many permitting-related programs and requirements, including:

1. It is the basis of design as documented in CTCs and CTOs;
2. It is the defining threshold in the VPDES program for classifying a major facility;

[3] The term design flow is not explicitly defined in the regulations, but it is a term widely used and applied in the context of municipal sewage treatment plants.

[4] In a 2016 proposal to clarify that only limits based on technology standards must be based on design flow, EPA stated that "Although this proposal would clarify this flexibility for POTWs, it is not intended to preclude or restrict a permitting authority from using the POTW design flow for the purpose of developing WQBELs." Final action on this proposal was deferred (84 FR 3332; 2/12/19).

[5] See GM-2011, pg. 27. Also see, *EPA NPDES Permit Writers' Manual*, September 2010, pg. 5-7.

3. It is the basis of many Chesapeake Bay Program requirements, including classification of facilities (e.g. significant/nonsignificant), application of the 'Tech Reg' requirements (9VAC25-40), and the basis of WLAs;
4. Pretreatment and WET program applicability thresholds are triggered by design flow;
5. The NPDES/VPDES regulations require the use of design flow for POTWs when evaluating production-based limits, which is interpreted to apply to the ELG parameters BOD and TSS. Therefore, the use of design flow is a clear requirement for certain programs/regulations.[6]

Recommended Position

All future POTW permitting decisions are to use facility design flow, or a flow that is based on treatment capacity and is also associated with a CTC/CTO. This flow is to be used to evaluate all parameters governed by the VPDES individual permit.

Past permitting decisions that incorporated an operational flow tier may be allowed to remain in the current permit. The decision to continue to allow existing operational flow tiers to remain in place shall be evaluated with each permit cycle. If continued, only one operation flow tier is to be recognized. All other operational flow tiers, or tiers not continued, are to be removed upon permit reissuance. No new operational flow tier-based permits will be issued.

Basis

1. 9VAC25-31-230 B provides, under the heading "Production-based Limits" that "In the case of POTWs, permit effluent limitations, standards, or prohibitions shall be calculated based on design flow." It is logical and appropriate to apply what has been interpreted to focus on the ELG parameters BOD and TSS to all pollutants.
2. The use of design flow is protective of water quality and has been standard agency practice in part to ensure that POTWs have flexibility to address growth and other factors such as wet weather that can vary significantly.
3. Use of a flow other than design flow would complicate the permitting process by using different flows to evaluate different pollutants. For instance, BOD, TSS and ammonia (based on the developing ammonia guidance for the new criteria) use design flow, as does TN/TP under the ChesBay Program. Certain toxics may consider using an operational flow tier. This creates a very complicated regulatory/permitting landscape.
4. DEQ does not want to create an incentive for municipal wastewater treatment facilities to take existing treatment equipment offline to reduce rated flow.
5. Allowing continuation of the limited number of existing permits that include flow tiers is reasonable based on the following factors:
    a. These permits remain protective of water quality (i.e., limits have been developed to address specific flow tiers and such limits are applied based on the level of facility operation).
    b. These permits are generally older and some earlier documents suggested that flow tiers could be considered (e.g., the Application Addendum asks about other discharge flow tiers and a prior version asks, "Is your facility's design flow considerably greater than your current flow?)

[6] 9VAC25-31-230 B "Production-based Limits. 1. In the case of POTWs, permit effluent limitations, standards, or prohibitions shall be calculated based on design flow." (See also, 40 CFR 122.45 (b)).

c. Existing permits that include an operational flow tier typically include tiered (i.e., alternative) limits, with one set of limits based on design flow as provided for in 9VAC25-31-230 B 1.

It should be noted that as a result of our general agency practice many facilities have taken measures to comply with permit requirements that use design flow as a basis. Actions/measures have included: installing additional treatment, relocation of outfalls to larger receiving waters, conducting WER or BLM studies and translator studies. The costs borne by these facilities to meet permit limits have often been considerable, thus, changing our approach would potentially raise an issue of inequitable treatment.

I. Special Standards for pH

If the WQS for pH in the receiving stream is outside of the 6.0 S.U – 9.0 S.U. range (FEG secondary treatment standards, 40CFR 125.3 and 133), the limitations applied should be the more conservative of the upper and lower bounds. For example, if the WQS for pH in the receiving stream is 6.5 S.U – 9.5 S.U and the secondary treatment regulation applies or DEQ is applying secondary treatment regulation requirements to non-POTWs facility as best judgement, a minimum pH limit of 6.5 SU and a maximum pH limit of 9.0 SU should be imposed. Similarly, if the WQS for pH is between 3.7 and 8.0 S.U., the limitations applied should be 6.0 S.U to 8.0 S.U (the more conservative of the upper and lower bounds).