State of Vermont
Agency of Natural Resources
Department of Environmental Conservation

Procedure:	**NPDES Wastewater Permit Equivalent to Secondary Treatment Standards**	**Effective Date:**	**1/31/2018**
Applicable To:	**Department of Environmental Conservation**	**Revision Date:**	**9/21/2023**
Prepared/ Revised by:	**WSMD Wastewater Program**	**Approved By:**	**Amy Polaczyk**

Procedure Objective

This procedure instructs permit writers how to determine if total suspended solids (TSS) equivalent to secondary treatment standards should be retained in renewed National Pollutant Discharge Elimination System (NPDES) permits for municipal wastewater treatment facilities (WWTFs).

Applicability

This procedure applies to publicly owned treatment works (POTWs) (also referred to as municipal WWTFs) that utilize a trickling filter or waste stabilization pond (herein referred to as aerated lagoon) as the principal wastewater treatment technology and have equivalent to secondary treatment standards in their current discharge permit.

This procedure does not apply to industrial WWTFs, pretreatment facilities, or municipal WWTFs without equivalent to secondary treatment technology based effluent limitations (TBELs).

Impacted Departments or Divisions

Department of Environmental Conservation – Watershed Management Division – Wastewater Program.

Required Resources

- Permit Application
- Current Permit & Fact Sheet
- Draft Permit & Fact Sheet
- Discharge Monitoring Reports
- Wastewater Inventory

- Dashboard Data Report: http://anrgdb:6262/ReportServer/Pages/ReportViewer.aspx?/DEC/WSMD/Wastewater/Reports/FacilityTabularDataSummary&rs:Command=Render
- Federal and State Regulations (see below)
- NPDES Permit Writers' Manual: https://www.epa.gov/npdes/npdes-permit-writers-manual
- Equivalent to Secondary Treatment Excel Worksheet: \\vtanr\docs\WSMD_Discharge\Special_Projects\LEAN\Permit LEAN\TSS\LagoonTSS_EQtoSecondary_Analysis.xlsx

Governing Documents

Federal Regulations:

- 40 CFR 122.44(a)(1) – general requirement for NPDES permits to include TBELs;
- 40 CFR 125.3(a)(1) – general requirement that TBELs for POTWs must be based on secondary treatment standards or equivalent to secondary treatment standards;
- 40 CFR 133.102 – secondary treatment standards;
- 40 CFR 133.103 – special considerations;
- 40 CFR 133.105 – treatment equivalent to secondary treatment standards;
- 40 CFR 133.105 – equivalent to secondary treatment standards

Relevant Definitions (all definitions for 40 CFR § 133 are located at 40 CFR 133.101):

- 40 CFR 133.101(f) – Effluent concentrations consistently achievable through proper operation and maintenance:
  (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 two years, excluding values attributable to upsets, bypasses, operational errors, or other unusual conditions, and (2) a 7-day average value equal to 1.5 times the value derived under paragraph (f)(1) of this section.
- 40 CFR 133.101(g) – Equivalent to secondary treatment standards criteria:
  Treatment works shall be eligible for consideration for effluent limitations described for treatment equivalent to secondary treatment (§ 133.105), if:
  (1) The BOD5 and TSS effluent concentrations consistently achievable through proper operation and maintenance (§ 133.101(f)) of the treatment works exceed the minimum level of the effluent quality set forth in §§ 133.102(a) and 133.102(b),
  (2) A trickling filter or waste stabilization pond is used as the principal process, and
  (3) The treatment works provide significant biological treatment of municipal wastewater.
- 40 CFR 133.101(k) – Significant biological treatment:
  The use of an aerobic or anaerobic biological treatment process in a treatment works to consistently achieve a 30-day average of a least 65 percent removal of BOD5.

State Regulations:

- Vermont Water Pollution Control Permit Regulations

Other Documents:

- Aerated Lagoon Performance (January 1988)
- NPDES Permit Writers' Manual
- Lagoon TSS Limits Spreadsheet

Timeline/Frequency

The PEP time for NPDES direct discharge permits is 180 days. This analysis shall occur during the NPDES discharge permit writing process, if the permit meets the aforementioned criteria.

Overview of Treatment Standards

The EPA requires BOD_5, TSS, percent removal, and pH TBELs in municipal WWTF NPDES permits. TBELs are based on the following treatment standards:

1. **Secondary treatment standards**: effluent limits achievable based on secondary treatment of wastewater; and

2. **Equivalent to secondary treatment standards**: an alternate set of effluent limitations suitable for facilities employing waste stabilization ponds (lagoons) or trickling filters as the principal treatment process. These treatment technologies were granted alternative secondary treatment standards because it was recognized that they could not consistently achieve all the secondary treatment standards, but still provided significant biological treatment. These treatment technologies were often employed in small communities. To avoid construction of costly new treatment systems to achieve secondary treatment standards, Congress passed legislation that offers these alternate limits.

Historically, VT has permitted many of the aerated lagoon facilities using a TSS monthly average concentration equivalent to secondary treatment standard. **Historically, VT has not issued BOD_5 equivalent to secondary treatment standard limits therefore, this procedure will focus only on TSS.** Some facilities may also have an increased daily max limitation, this will not be addressed either. Here are the federal and typical VT TSS treatment standards used:

TSS Treatment Standards

Treatment Standards	Monthly Average	Weekly Average	Daily Max (VT only)
Secondary Treatment Standards	30 mg/L	45 mg/L	50 mg/L
Federal Equivalent to Secondary Treatment Standards	Not to exceed 45 mg/L	Not to exceed 65 mg/L	---
Typical VT Equivalent to Secondary Treatment Standards	45 mg/L	45 mg/L	55 mg/L

VT Aerated Lagoon TSS Limits Spreadsheet

A list of aerated lagoons in Vermont with equivalent secondary treatment limits is available here: \\vtanr\docs\WSMD_Discharge\Resources\RESOURCES\Aerated_Lagoons\Aeration Lagoons TSS limits and Concentrations 2016 JAB20170210.xlsx

Equivalent to Secondary Treatment Standards Criteria

A WWTF must satisfy **all** of the following criteria in order to be eligible to receive equivalent to secondary treatment standards. There are three criteria:

- **Criteria #1: WWTF principal treatment process is a lagoon or trickling filter:**
  The largest percentage of BOD and TSS removal at the WWTF occurs using an aerated lagoon or trickling filter.

- **Criteria #2: WWTF consistently exceeds secondary treatment standards:**
  Effluent concentrations that are consistently achievable through proper operation and maintenance of the WWTF exceed the secondary treatment standards.

  Consistently achievable effluent concentrations are defined as:
  - For monthly average concentrations: the 95th percentile of monthly average effluent concentrations achieved by a WWTF in a period of at least 2 years, excluding values attributable to upsets, bypasses, operational errors, or other unusual conditions; and

  - For weekly average concentrations: a value 1.5 times the calculated monthly average 95th percentile.

- **Criteria #3: WWTF provides significant biological treatment:**
  The WWTF must consistently achieve at least 65 percent removal of monthly average BOD_5 concentrations.

Procedure 1 – Determine Which TSS Standards Apply

This procedure is relevant only to those WWTFs that have equivalent to secondary treatment limits in their discharge permits. To begin, determine if the current NPDES discharge permit has a TSS limitation based on an equivalent to secondary treatment standard. You will know this because:

a. The WWTF will utilize an aerated lagoon or trickling filter treatment technology; and
b. The monthly average TSS concentration limit in the current permit will be 45 mg/L; and/or
c. The weekly average TSS concentration limit in the current permit will be > 45 mg/L.

You should also verify the explanation of the limit(s) in the permit's fact sheet.

If a limit is based on the equivalent to secondary treatment standards, continue by verifying that the facility still qualifies for the limit by evaluating the WWTF using the three criteria.

If the limit is not based on equivalent to secondary treatment standards, then this procedure is not applicable to your discharge permit.

1. Satisfying Criteria #1

Determine where the largest percentage of BOD and TSS removal at the WWTF occurs. The treatment technology associated with the largest BOD and TSS removal is known as the principal treatment process. If the principal treatment process is an aerated lagoon or trickling filter, proceed with calculating **Criteria #2** for the equivalent to secondary treatment limits in the current permit. If the principal treatment process is not an aerated lagoon or trickling filter, the WWTF is not eligible to receive equivalent to secondary based TBELs. Proceed by including limits based upon secondary treatment standards as specified in **Procedure 2.2**.

2. Satisfying Criteria #2

Determine if the WWTF consistently exceeds TSS secondary treatment standards for those limits that are based on equivalent to secondary treatment:

Data Collection:

a. Collect at least 2 years' worth of monthly average and/or weekly average effluent TSS concentrations from the WWTF and input the data into the *Lagoon_TSS_EQtoSecondary* excel sheet. It is recommended that the last 5 years' worth of data is used. If the WWTF has made substantial changes to its operations or treatment processes within the last 5 years, the permit writer should use their best professional judgement to select a data period that is most representative of the discharge;
    i. See link for the *Lagoon_TSS_EQtoSecondary* Excel sheet above;
    ii. This data can be pulled easily using the *WW Search All Monitoring Data* report: http://anrgdb:6262/ReportServer/Pages/ReportViewer.aspx?/DEC/WSMD/Wastewater/Reports/FacilityTabularDataSummary&rs:Command=Render

b. Next, if applicable, identify the monthly average values that exceed the TSS secondary treatment standard of 30 mg/L;

c. Then, if applicable, identify the weekly average values that exceed the TSS secondary treatment standard of 45 mg/L;

d. Examine the explanations for each exceedance and eliminate those values attributable to upsets, bypasses, operational errors, or other unusual conditions (excluding algae blooms) from the 95th percentile analysis. Exceedance explanations should be in the Wastewater Inventory Correspondence Folder or in the comments section of the WR-43 report or electronic Discharge Monitoring Report.

For Monthly Averages:

a. Calculate the 95th percentile of the remaining monthly average TSS values. The 95th percentile is considered by EPA to be the concentration consistently achievable through proper operation and maintenance;

b. Compare the 95th percentile to the monthly average secondary treatment standard of 30 mg/L:

If the 95th Percentile > 30 mg/L, the criterion has been met and the WWTF is eligible to maintain the monthly average equivalent to secondary treatment TBEL, contingent upon satisfying **Criteria #3**.	If the 95th Percentile < 30 mg/L, the WWTF is not eligible to receive a monthly average equivalent to secondary treatment TBEL; proceed by including limits based upon secondary treatment standards as specified in **Procedure 2.2**.

For Weekly Averages:

It is unlikely you will find a permit with a weekly average equivalent to secondary treatment standard. If you do, follow these steps to evaluate the limit against Criteria #2:

a. 1.5 times the monthly average 95th percentile value is considered the weekly average concentration consistently achievable through proper operation and maintenance by EPA. Multiply the 95th percentile (calculated above) by 1.5;

b. Compare this value to the weekly average secondary treatment standard of 45 mg/L:

If the weekly average value is > 45 mg/L, the criterion has been met and the WWTF is eligible to maintain the weekly average equivalent to secondary treatment TBEL, contingent upon satisfying **Criteria #3**.	If the weekly average value is < 45 mg/L, the WWTF is not eligible to receive a weekly average equivalent to secondary treatment TBEL; proceed by including limits based upon secondary treatment standards as specified in **Procedure #2.2**.

3. Satisfying Criteria #3

Criteria #3 is the WWTF must provide significant biological treatment. Significant biological treatment means that the WWTF consistently achieves at least 65% removal of monthly average BOD_5 concentrations. To evaluate this:

a. Collect BOD_5 percent removal data for the **same data collection period used in Criteria #2** and input the data into the *Lagoon_TSS_EQtoSecondary* excel sheet.
   i. The *Lagoon_TSS_EQtoSecondary* Excel sheet is available above;
   ii. BOD_5 percent removal data can be pulled easily using the *WW Search All Monitoring Data* report: http://anrgdb:6262/ReportServer/Pages/ReportViewer.aspx?/DEC/WSMD/Wastewater/Reports/FacilityTabularDataSummary&rs:Command=Render

b. Calculate the 95th percentile of the percent removal dataset;

c. Compare the 95th percentile to 65% removal:

If the 95th Percentile > 65% removal, the WWTF is considered to be providing significant biological treatment and satisfies Criteria #3. Proceed by including equivalent to secondary treatment standards in the draft permit and fact sheet as specified in **Procedure 2.1.**	If the 95th percentile is < 65% removal, the WWTF is not consistently providing significant biological treatment and does not qualify for equivalent to secondary treatment standards. Proceed by including limits based upon secondary treatment standards as specified in **Procedure 2.2**.

Procedure 2 – Include Standards in Draft Permit and Fact Sheet

1. If Criteria #1 – 3 have been met:

If the WWTF satisfied Criteria #1 – 3, carryover the equivalent to secondary standard TSS limits to the draft permit and fact sheet.

a. As mentioned above, typically the equivalent to secondary standard for TSS will be 45 mg/L, monthly average:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS							
	Annual Average	Monthly Average	Weekly Average	Maximum Day	Monthly Average	Weekly Average	Maximum Day	Instantaneous Maximum
		Mass (**lbs/day**)			Concentration (**mg/L**)			
Flow	0.250 MGD[1]	Monitor Only						
Ultimate Oxygen Demand[2]				400				
Biochemical Oxygen Demand (5-day, 20° C) (BOD_5)		63	94		30	45	50	
Total Suspended Solids (TSS)		94	94		45	45	50	

b. In addition, include language explaining the basis for the limitation(s) in the draft permit's fact sheet. Here is an example of language that can be used:

Total Suspended Solids (TSS)

The effluent limitations for TSS remain unchanged from the current permit. The monthly average (45 mg/L) and weekly average (45 mg/L) reflect a level of effluent quality attainable by facilities eligible for treatment equivalent to secondary treatment. Because the WWTF has not consistently achieved the TSS effluent limitations set forth under 40 C.F.R. § 133.102(b), the WWTF meets the criteria under 40 C.F.R. § 133.101(g)[1] necessary for eligibility for application of the effluent limitations for treatment equivalent to secondary treatment. In addition, the draft permit contains a 50 mg/L, maximum day, TSS limitation. This is the Secretary standard applied to all such discharges pursuant to 13.4(c) of the Vermont Water Pollution Control Permit Regulations. The Secretary implements the limit to supplement the federal technology-based limitations to prevent a gross one-day permit effluent violation to be offset by multiple weekly and monthly sampling events which would enable a discharger to comply with the weekly average and monthly average permit limitations. Mass limits (XX lbs/day, monthly average and XX lbs/day, weekly average) are calculated using the concentration limits outlined above and the permitted flow. The monthly TSS monitoring requirement is unchanged from the current permit.

[1]Facilities may be eligible for the effluent limitations for treatment equivalent to secondary treatment if: (1) the TSS effluent concentrations consistently achievable through proper operation and maintenance of the treatment works exceed the minimum level of effluent quality set forth in 40 C.F.R. § 133.102(b); (2) a waste stabilization pond is used as the principal process; and (3) the treatment works provides significant biological treatment of municipal wastewater.

c. Finally, save the *Lagoon_TSS_EQtoSecondary* spreadsheet in the permit record.

2. If Criteria #1 – 3 have not been met:

If the WWTF does not satisfy all of the criteria, the WWTF does not qualify for TSS limitations based upon equivalent to secondary treatment standards.

a. Include the secondary treatment standard TBEL(s) in the draft permit:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS							
	Annual Limitation	Monthly Average	Weekly Average	Maximum Day	Monthly Average	Weekly Average	Maximum Day	Instantaneous Maximum
		Mass (**lbs/day**)			Concentration (**mg/L**)			
Flow[1]	0.150 MGD	Monitor only						
Biochemical Oxygen Demand (5-day, 20° C) (BOD_5)		38 lbs	56 lbs		30 mg/l	45 mg/l	50 mg/l	
Total Suspended Solids (TSS)[2]		38 lbs	56 lbs		30 mg/l	45 mg/l	50 mg/l	

b. In addition, include language explaining the basis for the limitation(s) in the draft permit's fact sheet. Here is an example of language that can be used:

Total Suspended Solids (TSS)

The monthly average effluent limitation for TSS has changed from the current permit. The facility has been achieving the secondary treatment standard TSS effluent limitations set forth under 40 C.F.R. § 133.102(b) for at least the past five years based upon the Discharge Monitoring Report (DMR) WR-43 forms submitted by the facility. Because the facility has consistently been achieving the TSS effluent limitations set forth under 40 C.F.R. § 133.102(b), the facility does not meet all of the criteria under 40 C.F.R. § 133.101(g) necessary for eligibility for application of the effluent limitations for treatment equivalent to secondary treatment, and it follows that the facility must comply with the secondary treatment standards for TSS: (1) the 30-day average shall not exceed 30 mg/l; (2) the seven-day average shall not exceed 45 mg/l. The seven-day average concentration limit of 45 mg/l and the 50 mg/l maximum day concentration limit remain unchanged from the current permit. The TSS monthly monitoring requirement is unchanged from the current permit.

c. Finally, save the *Lagoon_TSS_EQtoSecondary* spreadsheet in the permit record.

SOP Changes since previous version (including rationale)

- PEP time was revised from 120-195 days to 180 days.

Notices

- These procedures are intended to support the Agency of Natural Resources internal control environment.
- In consideration of these procedures, the objective should be on adherence and not on rationalizing ways and means for circumvention.
- Nothing in this document shall limit or supersede any applicable Federal or State laws, statutes, bulletins, or regulations.