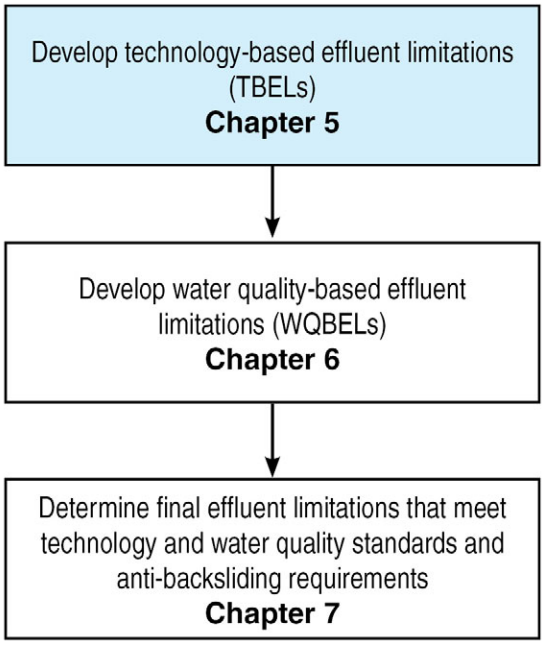
CHAPTER 5. Technology-Based Effluent Limitations

One of the major strategies of the Clean Water Act (CWA) in making "reasonable further progress toward the national goal of eliminating the discharge of all pollutants" is to require effluent limitations based on the capabilities of the technologies available to control those discharges. Technology-based effluent limitations (TBELs) aim to prevent pollution by requiring a minimum level of effluent quality that is attainable using demonstrated technologies for reducing discharges of pollutants or pollution into the waters of the United States. TBELs are developed independently of the potential impact of a discharge on the receiving water, which is addressed through water quality standards and water quality-based effluent limitations (WQBELs). The NPDES regulations at Title 40 of the *Code of Federal Regulations* (CFR) 125.3(a) require NPDES permit writers to develop technology-based treatment requirements, consistent with CWA section 301(b), that represent the minimum level of control that must be imposed in a permit. The regulation also indicates that permit writers must include in permits additional or more stringent effluent limitations and conditions, including those necessary to protect water quality. As described in Chapter 7 of this manual, the permit writer might also need to apply anti-backsliding requirements to determine the final effluent limitations for the NPDES permit.

This chapter discusses development of TBELs for publicly owned treatment works (POTWs) and industrial (non-POTWs) dischargers. Chapter 6 discusses development of WQBELs. Exhibit 5-1 illustrates the relationship between TBELs and WQBELs in an NPDES permit and the determination of final effluent limitations.

Exhibit 5-1 Developing effluent limitations



5.1 Technology-based Effluent Limitations for POTWs

The largest category of dischargers requiring individual NPDES permits is POTWs. The federal regulations at § 403.3(q) define a POTW as a treatment works (as defined in CWA section 212), that is owned by a state or municipality [as defined in CWA section 502(4)]. Under § 403.3(q), that definition includes "any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature." The definition also includes "sewers, pipes, and other conveyances only if they convey wastewater to a POTW Treatment Plant," as defined in § 403.3(r). Under § 403.3(q), the term POTW "also means the municipality as defined in section 502(4) of the Act which has jurisdiction over the Indirect Discharges to and the discharges from such a treatment works."

CWA section 304(d) required the U.S. Environmental Protection Agency (EPA) to publish information on the degree of effluent reduction attainable through the application of secondary treatment. Under CWA section 301(b)(1)(B), in general, POTWs in existence on July 1, 1977, were required to meet discharge limitations based on secondary treatment (or any more stringent limitations established under state law, including those necessary to meet state water quality standards). On the basis of those statutory provisions, EPA developed secondary treatment regulations, which are specified in Part 133. Later amendments to CWA section 304(d) called for EPA to develop alternative standards for certain types of POTWs. Those standards are referred to as "equivalent to secondary treatment" standards.

5.1.1 Secondary and Equivalent to Secondary Treatment Standards

Several regulations implement the statutory requirements for developing standards and discharge limitations based on secondary treatment. EPA has promulgated regulations in Part 133 establishing secondary treatment standards, equivalent to secondary treatment standards, and a number of special considerations applied on a case-by-case basis. In addition, § 122.44(a)(1) requires that NPDES permits include applicable technology-based limitations and standards, while regulations at § 125.3(a)(1) state that TBELs for POTWs must be based on secondary treatment standards (which includes the "equivalent to secondary treatment standards") specified in Part 133.

5.1.1.1 Secondary Treatment Standards

In Part 133, EPA published secondary treatment standards based on an evaluation of performance data for POTWs practicing a combination of physical and biological treatment to remove biodegradable organics and suspended solids. The regulation applies to all POTWs and identifies the technology-based performance standards achievable based on secondary treatment for 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), and pH. Exhibit 5-2 summarizes the standards.

Exhibit 5-2 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)	not less than 85%	--
pH	within the limits of 6.0–9.0*	

* unless the POTW demonstrates that: (1) inorganic chemicals are not added to the waste stream as part of the treatment process; and (2) contributions from industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0 mg/L = milligrams per liter

The regulation also includes an alternate set of standards that apply to certain facilities employing waste stabilization ponds or trickling filters as the principal process. Those standards are called equivalent to secondary treatment standards.

5.1.1.2 Equivalent to Secondary Treatment

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. Congress recognized that unless alternate limitations were set for facilities with trickling filters or waste stabilization ponds, which often are in small communities, such facilities could be required to construct costly new treatment systems to meet the secondary treatment standards even though their existing treatment technologies could achieve significant biological treatment. To prevent requiring upgrades where facilities were achieving their original design performance levels, Congress included provisions in the 1981 amendments to the Clean Water Act Construction Grants program (*Public Law 97-117, Section 23*) that required EPA to make allowances for alternative biological treatment technologies, such as a trickling filters or waste stabilization ponds. In response to that requirement, in 1984, EPA promulgated regulations at § 133.105 that include alternative standards that apply to facilities using "equivalent to secondary treatment." A facility must meet the criteria in § 133.101(g) to qualify for application of those alternative standards.

Equivalent to Secondary Standards

The equivalent to secondary treatment standards, as specified in § 133.105, are shown in Exhibit 5-3.

Exhibit 5-3 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%	--
pH	within the limits of 6.0–9.0*	

* unless the POTW demonstrates that: (1) inorganic chemicals are not added to the waste stream as part of the treatment process; and (2) contributions from industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0

Criteria to Qualify for Equivalent to Secondary Standards

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

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 BOD_5 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

- (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.
- (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.

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).

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 BOD_5.

A permit writer should consider each facility on a case-by-case basis to determine whether it meets those three criteria. To apply the criteria, the permit writer should assemble enough influent, effluent, and flow data from the facility to adequately characterize the facility's performance or require the discharger to provide an appropriate analysis. If the facility has made substantial changes in its operations or treatment processes during the current permit term, the permit writer, using his or her best professional judgment (BPJ), may elect to use data for a period that is representative of the discharge at the time the permit is being drafted. Facilities that do not meet all three criteria do not qualify as equivalent to secondary treatment facilities. For such facilities, the secondary treatment standards apply. EPA noted in its December 1985 *Draft Guidance for NPDES Permits and Compliance Personnel—Secondary Treatment Redefinition*[1] that a treatment works operating beyond its design hydraulic or organic loading limit is not eligible for application of equivalent to secondary standards. If overloading or structural failure is causing poor performance, the solution to the problem is construction, not effluent limitations adjustment.

5.1.2 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.

5.1.2.1 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 BOD_5 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. EPA has published approved alternate TSS requirements in 49 *Federal Register* (FR) 37005, September 20, 1984. Exhibit 5-4 is a summary from the FR notice of the adjusted TSS requirements for each state.

Exhibit 5-4 State-specific adjusted TSS requirements*

Location	Alternate TSS limitation (30-day average) (mg/L)	Location	Alternate TSS limitation (30-day average) (mg/L)
Alabama	90	Nebraska	80
Alaska	70	North Carolina	90
Arizona	90	North Dakota	
Arkansas	90	• North and east of Missouri R.	60
California	95	• South and west of Missouri R.	100
Colorado		Nevada	90
• Aerated ponds	75	New Hampshire	45
• All others	105	New Jersey	None
Connecticut	None	New Mexico	90
Delaware	None	New York	70
District of Columbia	None	Ohio	65
Florida	None	Oklahoma	90
Georgia	90	Oregon	
Guam	None	• East of Cascade Mountains	85
Hawaii	None	• West of Cascade Mountains	50
Idaho	None	Pennsylvania	None
Illinois	37	Puerto Rico	None
Indiana	70	Rhode Island	45
Iowa		South Carolina	90
• Controlled discharge, 3 cell	Case-by-case but not greater than 80	South Dakota	120
• All others	80	Tennessee	100
Kansas	80	Texas	90
Kentucky	None	Utah	None
Louisiana	90	Vermont	55
Maine	45	Virginia	
Maryland	90	• East of Blue Ridge Mountains	60
Massachusetts	None	• West of Blue Ridge Mountains	78
Michigan: Controlled seasonal discharge		• East slope counties: Loudoun, Fauquier, Rappahannock, Madison, Green, Albemarle, Nelson, Amherst, Bedford, Franklin, Patrick.	Case-by-case application of 60/78 limits
• Summer	70	Virgin Islands	None
• Winter	40	Washington	75
Minnesota	40	West Virginia	80
Mississippi	None	Wisconsin	80
Missouri	80	Wyoming	100
Montana	100	Trust Territories and N. Marianas	None

* (49 FR 37005, September 20, 1984)

5.1.2.2 Alternative State Requirements (ASRs)

To further address the potential variations in facility performance arising from geographic, climatic, or seasonal conditions in different states, the revised secondary treatment regulations (adopted in 1984) also included provisions in § 133.105(d) for ASRs. The ASR provisions give states flexibility to modify the maximum allowable concentrations of both BOD_5 and TSS for trickling filter facilities and for BOD_5 for waste stabilization pond facilities. ASRs are set at levels consistently achievable through proper operation and maintenance [§ 133.101(f)] by the median facility in a representative sample of facilities within a state or appropriate continuous geographical area that meet the definition of facilities eligible for treatment equivalent to secondary treatment. Qualifying facilities are eligible to receive limitations up to the concentrations specified by the ASRs.

5.1.3 Applying Secondary Treatment Standards, Equivalent to Secondary Treatment Standards, and Adjusted Standards

Determining whether secondary treatment standards or equivalent to secondary standards apply to a POTW and determining the specific discharge limitations for the facility based on either set of standards and any other special considerations that might apply can be a complex process. Permit writers should remember that compliance with limitations must be measurable and percent removal limitations require influent monitoring (for more on establishing monitoring conditions, see section 8.1 of this manual). This section presents a step-by-step procedure to establishing technology-based effluent limitations for POTWs as shown in Exhibit 5-5.

Exhibit 5-5 Steps to establish technology-based discharge limitations for POTWs

Step 1.	Determine whether secondary treatment standards or equivalent to secondary treatment standards or adjusted standards apply
Step 2.	Calculate effluent limitations based on secondary treatment standards or
Step 3.	Calculate effluent limitations based on equivalent to secondary standards or
Step 4.	Calculate effluent limitations based on adjusted standards
Step 5.	Apply special considerations for further adjustments
Step 6.	Document the application of secondary or equivalent to secondary treatment standards or adjusted standards and all special considerations in the fact sheet

5.1.3.1 Step 1: Determine Whether Secondary Treatment Standards or Equivalent to Secondary Treatment Standards or Adjusted Standards Apply

The first step for permit writers to develop TBELs for municipal dischargers is to determine whether secondary treatment standards (discussed in section 5.1.1 above), equivalent to secondary standards (discussed in section 5.1.1.2 above), or some adjustments to the equivalent to secondary standards (discussed in section 5.1.2 above) apply to the POTW.

An important consideration for permitting authorities is how to treat new POTW discharges that use a waste stabilization pond or trickling filter, or a combination of the two. New facilities or new discharges from trickling filters or waste stabilization ponds often are capable of achieving secondary treatment standards. In the preamble to the secondary treatment regulation (49 FR 37002, September 20, 1984) and in § 133.105(f)(2), EPA noted that when developing permits for new trickling filter and waste

stabilization pond facilities, permitting authorities should consider the ultimate design capability of the treatment process, geographical and climatic conditions, and the performance capabilities of recently constructed facilities in similar situations.

After determining whether secondary treatment standards or equivalent to secondary treatment standards apply to a facility or a discharge, the permit writer applies the appropriate standards to develop effluent limitations. Section 5.1.3.2 below (Step 2) details development of effluent limitations for facilities or discharges where secondary treatment standards apply; section 5.1.3.3 below (Step 3) details development of limitations for facilities that qualify for equivalent to secondary standards; and section 5.1.1.4 below (Step 4) details development of limitations for facilities where adjusted standards apply. It is possible that a facility with multiple biological treatment processes could have limitations based on a combination of the standards (see section 5.1.3.5 below [Step 5]); therefore, those sections are presented as separate steps.

5.1.3.2 Step 2: Calculate Effluent Limitations Based on Secondary Treatment Standards

If the facility being permitted is subject to the secondary treatment standards, the permit writer should complete Step 2. Otherwise, he or she should move to Step 3 in section 5.1.3.3 below.

Applying the secondary treatment standards in NPDES permits is straightforward. Where secondary treatment standards apply, the permit should include effluent limitations in the permit as presented in Exhibit 5-6 below, consistent with the secondary treatment standards and the regulatory requirements in § 122.45(d)(2).

Exhibit 5-6 Effluent limitations calculated from secondary treatment standards

Parameter	Average monthly limitation	Average weekly limitation
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)	not less than 85%	N/A
pH	Within the range of 6.0–9.0 standard units at all times (or expressed as instantaneous minimum and maximum limitations)*	

* unless the POTW demonstrates that: (1) inorganic chemicals are not added to the waste stream as part of the treatment process; and (2) contributions from industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0

Certain provisions in the EPA regulations warrant some clarification.

First, the secondary treatment standards are stated as 30-day and 7-day averages, whereas § 122.45(d)(2) requires that effluent limitations for POTWs be expressed, unless impracticable, as average monthly and average weekly limitations. The NPDES regulations in § 122.2 define average monthly and average weekly limitations on a calendar period basis. Therefore, EPA recommends that permit writers apply the 30-day and 7-day average secondary treatment standards directly as average monthly (calendar month) and average weekly (calendar week) discharge limitations.

Second, § 122.45(f)(1) requires that all permit limitations, standards, or prohibitions be expressed in terms of mass except in any of the following cases:

- For pH, temperature, radiation or other pollutants that cannot appropriately be expressed by mass limitations.

- When applicable standards and limitations are expressed in terms of other units of measure.
- If in establishing permit limitations on a case-by-case basis under § 125.3, limitations expressed in terms of mass are infeasible because the mass of the pollutant discharged cannot be related to a measure of operation, and permit conditions ensure that dilution will not be used as a substitute for treatment.

The first condition applies to pH requirements established by secondary treatment standards. In addition, because the 30-day and 7-day average requirements for BOD_5 and TSS, including percent removal, are expressed in terms of concentration, the second condition applies to the standards. Thus, mass-based discharge limitations are not specifically required to implement secondary treatment standards; however, permit writers can choose to include mass-based limitations in a permit. In general, regulations at § 122.45(b)(1) require using the design flow rate of the POTW to calculate limitations. To calculate a mass-based limitation for a POTW (in pounds per day [lbs/day]) a permit writer would use the equation and follow the example calculations in Exhibit 5-7.

Exhibit 5-7 POTW mass based limitation calculation equation and example calculations

POTW design flow in million gallons per day (mgd)	x	**Concentration-based limitation** in milligrams per liter (mg/L)	x	**Conversion factor** 8.34 with units of (lbs)(L) / (mg)(millions of gallons)

A POTW with a design flow of 2.0 mgd would have mass-based limitations calculated from secondary treatment standards as follows:

Mass-based limitation*	=	**POTW design flow** x **Concentration-based limitation** x **Conversion factor**		
BOD_5				
Average monthly	=	2.0 mgd x 30 mg/L x 8.34 (lbs)(L) / (mg)(millions of gallons)	=	**500 lbs/day**
Average weekly	=	2.0 mgd x 45 mg/L x 8.34 (lbs)(L) / (mg)(millions of gallons)	=	**750 lbs/day**
TSS				
Average monthly	=	2.0 mgd x 30mg/L x 8.34 (lbs)(L) / (mg)(millions of gallons)	=	**500 lbs/day**
Average weekly	=	2.0 mgd x 45mg/L x 8.34 (lbs)(L) / (mg)(millions of gallons)	=	**750 lbs/day**

* calculated to 2 significant figures

5.1.3.3 Step 3: Calculate Effluent Limitations Based on Equivalent to Secondary Standards

If a facility being permitted is subject to the equivalent to secondary standards without any further adjustments by the state (e.g., ASRs), the permit writer should complete Step 3. Otherwise, he or she should move to Step 4 in section 5.1.3.4 below.

For facilities that qualify for equivalent to secondary standards, effluent limitations must meet the requirements specified in § 133.105 and summarized above in Exhibit 5-3 (not accounting for any further approved adjustments). It is important to note that the equivalent to secondary standards specify the maximum allowable discharge concentration of BOD_5 and TSS and a minimum percent removal requirement for qualified facilities. The regulations at § 133.105(f) require a permitting authority to include more stringent limitations when it determines that the 30-day average and 7-day average BOD_5 and TSS concentrations are achievable through proper operation and maintenance of the treatment works

(based on an analysis of the past performance for an existing facility or considering the design capability of the treatment process and geographical and climatic conditions for a new facility) would enable the treatment works to achieve more stringent limitations than the least stringent effluent quality allowed by the equivalent to secondary standards. As noted above, the regulations at § 133.101(f) define, "effluent concentrations consistently achievable through proper operation and maintenance" as 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. The 7-day average value is set equal to 1.5 times the 30-day average value.

If an existing facility does not have sufficient data to establish past performance, the permit writer could include the limitations from the previous permit in the new permit and require monitoring to generate the necessary data. In addition, the permit writer could choose to include a provision allowing the permitting authority to reopen and, if necessary, modify the permit after reviewing the additional data collected by the discharger.

As with limitations based on secondary treatment standards (shown in Exhibit 5-6 above), limitations based on equivalent to secondary standards are expressed as average monthly (calendar month) and average weekly (calendar week) limitations. Mass-based limitations can be calculated using the procedures outlined above.

5.1.3.4 Step 4: Calculate Effluent Limitations Based on Adjusted Standards

If a facility being permitted is subject to the adjusted standards as described in section 5.1.2 above, the permit writer should complete Step 4. Otherwise, he or she should move to section 5.1.3.5 below (Step 5).

As discussed in sections 5.1.2.1 and 5.1.2.2 above, the federal regulations at § 133.103(c) allow states to adjust the maximum allowable discharge concentration of TSS for waste stabilization ponds upward from what would otherwise be required by the equivalent to secondary standards, and the regulations at § 133.105(d) give states flexibility to adopt ASRs that modify equivalent to secondary requirements for both BOD_5 and TSS for trickling filter facilities and BOD_5 requirements for waste stabilization pond facilities. Where one or more of the adjusted standards apply, average monthly limitation(s) generally should be set at the lower of the following:

- The 30-day average concentration of the pollutant that could be achievable through proper operation and maintenance of the treatment works.
- The maximum concentration of the pollutant that would be allowed under the adjusted standard.

Permit writers should note, however, that if the state has developed an adjusted TSS standard for waste stabilization ponds consistent with § 133.103(c), the regulations would allow uniform application of that standard to POTWs where waste stabilization ponds are the principal process used for secondary treatment and operation and maintenance data indicate that the equivalent to secondary treatment standards for TSS cannot be achieved.

The average weekly limitation can be set equal to 1.5 times the average monthly limitation and mass-based limitations may be calculated using the procedures outlined above.

5.1.3.5 Step 5: Apply Special Considerations for Further Adjustments

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.

Substitution of $CBOD_5$ for BOD_5

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 the 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. For wastewaters with significant nitrogen content, basing permit limitations on $CBOD_5$ instead of BOD_5 eliminates the impact of nitrification on discharge limitations and compliance determinations. 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.

EPA has established $CBOD_5$ standards for cases where secondary treatment standards or equivalent to secondary treatment standards are applied:

- **Secondary Treatment:** The $CBOD_5$ secondary treatment performance standards specified by the regulations are as follows:
  - 25 mg/L as a 30-day average.
  - 40 mg/L as a 7-day average.
- The EPA-approved test procedures in Part 136 include a $CBOD_5$ (nitrogen inhibited) test procedure. Subject to any state-specific requirements, a permit writer can specify these $CBOD_5$ limitations along with $CBOD_5$ monitoring requirements in any POTW permit requiring performance based on secondary treatment standards [§ 133.102(a)(4)].
- **Equivalent to Secondary Treatment:** The $CBOD_5$ equivalent to secondary treatment performance standards specified by the regulations are as follows:
  - No greater than 40 mg/L as a 30-day average.
  - No greater than 60 mg/L as a 7-day average.
- Where data are available to establish $CBOD_5$ limitations, and subject to any state-specific requirements, a permit writer may substitute $CBOD_5$ for BOD_5 and specify $CBOD_5$ limitations and monitoring requirements when applying equivalent to secondary standards.

Substitution of COD or TOC for BOD_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.

Adjustments for Industrial Contributions

Under § 133.103(b), treatment works receiving wastes from industrial categories with effluent limitations guidelines and standards (effluent guidelines) requirements or new source performance standards for BOD_5 or TSS, which are less stringent than the secondary treatment standards or, if applicable, the equivalent to secondary treatment standards in Part 133, can qualify to have their 30-day BOD_5 or TSS limitations adjusted upward provided that the following are true:

- The adjusted 30-day limitations are not greater than the limitations in effluent guidelines or new source performance standards, as applicable, for the industrial category.
- The flow or loading of BOD_5 or TSS introduced by the industrial category exceeds 10 percent of the design flow or loading to the POTW.

When making this adjustment, the Part 133 values for BOD_5 and TSS should be adjusted proportionately. Accordingly, a permit writer should make the adjustment using a flow-weighted or loading-weighted average of the two concentration limitations (i.e., the limitations developed from effluent guidelines for the industrial facility and the secondary or equivalent to secondary limitations).

Adjustments to Percent Removal Requirements

The 85 percent removal requirement (for a 30-day average) in secondary treatment standards was originally established to achieve two basic objectives:

- To encourage municipalities to remove high quantities of infiltration and inflow (I/I) from their sanitary sewer systems.
- To prevent intentional dilution of influent wastewater.

In facilities with dilute influent that is not attributable to high quantities of I/I or intentional dilution, the percent removal requirement could result in forcing *advanced treatment* rather than the intended secondary treatment. Advanced treatment generally refers to treatment processes following secondary treatment (e.g., filtration, chemical addition, or two-stage biological treatment). Advanced treatment can achieve significantly greater pollutant removals than secondary treatment processes but at a higher cost.

The regulations at §§ 133.103(a), (d) and (e) provide that, under certain circumstances, permit writers may set less stringent limitations for BOD_5 and TSS percent removal. The specific circumstances and the potential adjustments to the percent removal requirement are as follows:

- **Treatment works that receive less concentrated wastes from combined sewer systems** are eligible to have less stringent monthly percent removal limitations during wet-weather events [§ 133.103 (a)] and, under certain conditions, less stringent percent removal requirements or a mass loading limitation instead of a percent removal requirement during dry weather [§ 133.103 (e)]. The permit writer must determine on a case-by-case basis whether any attainable percentage removal level can be defined during wet weather and, if so, what the level should be. To qualify for a less stringent percent removal requirement or substitution of a mass limitation during dry weather, the discharger must satisfactorily demonstrate the following:

  1. <u>The facility is consistently meeting, or will consistently meet, its permit effluent concentration limitations, but cannot meet its percent removal limitations because of less concentrated influent</u>. A permitting authority should consider establishing criteria for

documenting what constitutes consistently meeting concentration limitations and what constitutes being unable to meet percent removal limitations because of less concentrated influent.

2. To meet the percent removal requirements, the facility would have to achieve significantly more stringent effluent concentrations than would otherwise be required by the concentration-based standards. Each permitting authority also should consider establishing criteria for demonstrating that this condition is met (e.g., because of dilute influent, X percent of the time a discharger would be forced to meet concentration requirements that are X percent more stringent than the concentration limitations otherwise applicable to satisfy the percent removal requirements).

3. The less concentrated influent wastewater does not result from either excessive infiltration or clear water industrial discharges during dry weather periods. The determination of whether the less concentrated wastewater results from excessive infiltration is discussed in regulations at § 35.2005(b)(28). This regulation defines nonexcessive infiltration as the quantity of flow that is less than 120 gallons per capita per day (domestic base flow and infiltration) or the quantity of infiltration that cannot be economically and effectively eliminated from a sewer system as determined in a cost-effectiveness analysis. The regulations at § 133.103(e) include the additional criterion that either 40 gallons per capita per day or 1,500 gallons per inch diameter per mile of sewer may be used as the threshold value for that portion of dry-weather base flow attributed to infiltration. If the less concentrated influent wastewater is the result of clear water industrial discharges, then the treatment works must control such discharges pursuant to Part 403.

- **Treatment works that receive less concentrated wastes from separate sewer systems** can qualify to have less stringent percent removal requirement or receive a mass loading limitation instead of the percent removal requirement provided the treatment plant demonstrates all of the following [§ 133.103(d)]:

  1. The facility is consistently meeting or will consistently meet its permit effluent concentration limitations but cannot meet its percent removal limitations because of less concentrated influent wastewater. For additional detail on this criterion, see discussion above for combined sewers during dry weather.

  2. To meet the percent removal requirements, the facility would have to achieve significantly more stringent limitations than would otherwise be required by the concentration-based standards. For additional detail on this criterion, see the discussion above for combined sewers during dry weather.

  3. The less concentrated influent wastewater does not result from excessive infiltration and inflow (I/I). The regulation indicates that the determination of whether the less concentrated wastewater is the result of excessive I/I will use the definition of excessive I/I at § 35.2005(b)(16), plus the additional criterion that flow is nonexcessive if the total flow to the POTW (i.e., wastewater plus inflow plus infiltration) is less than 275 gallons per capita per day. The regulation at § 35.2005(b)(16) defines excessive I/I as the quantities of I/I that can be economically eliminated from a sewer system as determined in a cost-effectiveness analysis that compares the costs for correcting the I/I conditions to the total costs for

transportation and treatment of the I/I. This regulation also refers to definitions of nonexcessive I/I in §§ 35.2005(b)(28) and 35.2005(b)(29).

Secondary Treatment Variance for Ocean Discharge—CWA Section 301(h) Variance

CWA section 301(h) provides for variances from secondary treatment standards for POTWs that discharge into ocean waters if the modified requirements do not interfere with attainment or maintenance of water quality. Permit writers should note that the deadline to apply for a CWA section 301(h) variance (December 29, 1982) has passed, thus no new facilities may apply for this variance.

Eligible PTW applicants meeting the set of environmentally stringent criteria in CWA section 301(h) receive a modified NPDES permit waiving the secondary treatment requirements for the conventional pollutants of BOD_5, TSS, and pH. EPA issued regulations, developed the *Amended Section 301(h) Technical Support Document*[2], and prepared a website titled Amendments to Regulations Issued, the Clean Water Act Section 301 (h) Program <www.epa.gov/owow/oceans/discharges/301h.html>. EPA has promulgated specific regulations pertaining to CWA section 301(h) that are provided in Part 125, Subpart G.

All CWA section 301(h) variance modified permits must contain the following specific permit conditions:

- Effluent limitations and mass loadings that will assure compliance with Part 125, Subpart G.
- Requirements for pretreatment program development, a nonindustrial toxics control program, and control of combined sewer overflows.
- Monitoring program requirements that include biomonitoring, water quality, and effluent monitoring.
- Reporting requirements that include the results of the monitoring programs.

No new or substantially increased discharges from the point source of the affected pollutant can be released above that volume of discharge specified in the permit.

5.1.3.6 Step 6: Document the Application of Secondary or Equivalent to Secondary Treatment Standards and all Adjustments and Considerations in the Fact Sheet

Permit writers need to document their application of secondary or equivalent to secondary treatment standards in the NPDES permit fact sheet for municipal facilities. The permit writer should clearly identify the data and information used to determine whether secondary treatment standards or equivalent to secondary treatment standards or adjusted standards apply and how that information was used to derive effluent limitations for the permit. The permit writer should also note all adjustments and special considerations in the fact sheet. The information in the fact sheet should provide the NPDES permit applicant and the public a transparent, reproducible, and defensible description of how the NPDES permit properly incorporates secondary treatment standards.

5.2 Technology-Based Effluent Limitations for Industrial (Non-POTW) Dischargers

EPA is required to promulgate technology-based limitations and standards that reflect pollutant reductions that can be achieved by categories, or subcategories, of industrial point sources using specific

technologies (including process changes) that EPA identifies as meeting the statutorily prescribed level of control under the authority of CWA sections 301, 304, 306, 307, 308, 402, and 501 (33 *United States Code* [U.S.C.] 1311, 1314, 1316, 1318, 1342, and 1361). Those national industrial wastewater controls are called effluent limitations guidelines and standards (effluent guidelines). Unlike other CWA tools, such as water quality standards, effluent guidelines are national in scope and establish performance standards for all facilities within an industrial category or subcategory.

For point sources that introduce pollutants directly into the waters of the United States (direct dischargers), the effluent guidelines promulgated by EPA are implemented through NPDES permits as authorized in CWA sections 301(a), 301(b), and 402. For sources that discharge to POTWs (indirect dischargers), EPA promulgates pretreatment standards that apply directly to those sources and are enforced by POTWs and state and federal authorities as authorized in CWA sections 307(b) and (c).

When developing TBELs for industrial (non-POTW) facilities, the permit writer must consider all applicable technology standards and requirements for all pollutants discharged. Without applicable effluent guidelines for the discharge or pollutant, permit writers must identify any needed TBELs on a case-by-case basis, in accordance with the statutory factors specified in CWA sections 301(b)(2) and 304(b). The site-specific TBELs reflect the BPJ of the permit writer, taking into account the same statutory factors EPA would use in promulgating a national effluent guideline regulation, but they are applied to the circumstances relating to the applicant. The permit writer also should identify whether state laws or regulations govern TBELs and might require more stringent performance standards than those required by federal regulations. In some cases, a single permit could have TBELs based on effluent guidelines, BPJ, and state law, as well as WQBELs based on water quality standards.

Sections 5.2.1 and 5.2.2 below provide an overview of effluent guidelines and development of TBELs in NPDES permits using the effluent guidelines. Section 5.2.3 below discusses the development of TBELs in the absence of effluent guidelines (i.e., case-by-case limitations developed using BPJ).

5.2.1 Effluent Guidelines

Congress saw the creation of a single national pollution control requirement for each industrial category, based on the best technology the industry could afford, as a way to reduce the potential creation of *pollution havens* and to attain a high-level water quality in the nation's waters. Consequently, EPA's goal in establishing effluent guidelines is to ensure that industrial facilities with similar characteristics will meet similar effluent limitations representing the best pollution control technologies or pollution prevention practices regardless of their location or the nature of the receiving water into which the discharge is made. In establishing the effluent guidelines, EPA must consider the industry-wide economic achievability of implementing the technology and the incremental costs in relation to the pollutant-reduction benefits.

Effluent guidelines can include numeric and narrative limitations, including best management practices (BMPs), to control the discharge of pollutants from categories of point sources. The limitations are based on data characterizing the performance of technologies available and, in some cases, from modifying process equipment or the use of raw materials. Although the regulations do not require the use of any particular treatment technology, they do require facilities to achieve effluent limitations that reflect the proper operation of the *model* technologies selected as the basis for the effluent guidelines and from which the performance data were obtained to generate the limitations. Therefore, each facility has the

discretion to select any technology design and process changes necessary to meet the performance-based discharge limitations and standards specified by the effluent guidelines.

As of the date of this manual's publication, EPA has issued effluent guidelines for 56 industrial categories, which apply to between 35,000 and 45,000 facilities that discharge directly to waters of the United States and another 12,000 facilities that discharge into POTWs. The regulations prevent the discharge of more than 1.2 billion pounds of toxic (priority) and nonconventional pollutants each year. EPA's Effluent Guidelines Program Website <www.epa.gov/guide/> provides information on existing effluent guidelines, current effluent guidelines rulemaking, and the effluent guidelines planning process.

5.2.1.1 Statutory Foundation for Effluent Guidelines

The CWA directs EPA to promulgate effluent guidelines reflecting pollutant reductions that can be achieved by existing facilities in categories or subcategories of industrial point sources using specific control technologies. In addition, EPA is required to develop effluent guidelines for new sources. Those levels of control are summarized below and in Exhibit 5-8.

Exhibit 5-8 Summary of CWA technology levels of control

Type of sites regulated	BPT	BCT	BAT	NSPS	PSES	PSNS
Existing Direct Dischargers	X	X	X			
New Direct Dischargers				X		
Existing Indirect Dischargers					X	
New Indirect Dischargers						X
Pollutants regulated	**BPT**	**BCT**	**BAT**	**NSPS**	**PSES**	**PSNS**
Conventional Pollutants	X	X		X		
Nonconventional Pollutants	X		X	X	X	X
Toxic (Priority) Pollutants	X		X	X	X	X

Best Practicable Control Technology Currently Available (BPT)

BPT is the first level of technology-based effluent controls for direct dischargers and it applies to all types of pollutants (conventional, nonconventional, and toxic). The Federal Water Pollution Control Act (FWPCA) amendments of 1972 require that when EPA establishes BPT standards, it must consider the industry-wide cost of implementing the technology in relation to the pollutant-reduction benefits. EPA also must consider the age of the equipment and facilities, the processes employed, process changes, engineering aspects of the control technologies, non-water quality environmental impacts (including energy requirements), and such other factors as the EPA Administrator deems appropriate [CWA section 304(b)(1)(B)]. Traditionally, EPA establishes BPT effluent limitations on the basis of the average of the best performance of well-operated facilities in each industrial category or subcategory. Where existing performance is uniformly inadequate, BPT may reflect higher levels of control than currently in place in an industrial category if the Agency determines that the technology can be practically applied. See CWA sections 301(b)(1)(A) and 304(b)(1)(B).

Best Conventional Pollutant Control Technology (BCT)

The 1977 CWA requires EPA to identify effluent reduction levels for conventional pollutants associated with BCT for direct discharges from existing industrial point sources. As with BPT, when establishing BCT the Agency considers the age of the equipment and facilities, the processes employed, process changes, engineering aspects of the control technologies, non-water quality environmental impacts (including energy requirements), and such other factors as the EPA Administrator deems appropriate [CWA section 304(b)(4)(B)]. In addition, EPA also considers a two-part *cost reasonableness* test, as required by CWA section 304(b)(4)(B), which includes (1) consideration of the reasonableness of the relationship between the costs of attaining a reduction in effluent and the effluent reduction benefits derived and (2) a comparison of the cost and level of reduction of such pollutants from the discharge from POTWs to the cost and level of reduction of such pollutants from a class or category of industrial sources. EPA explained its methodology for developing BCT limitations in detail in 51 FR 24974, July 9, 1986 <www.epa.gov/npdes/pubs/fr_bct_1986.pdf>. See CWA sections 301(b)(2)(E) and 304(b)(4).

Best Available Technology Economically Achievable (BAT)

For the direct discharge of toxic and non-conventional pollutants, EPA promulgates effluent guidelines based on BAT. The FWPCA amendments of 1972 require EPA to consider the cost of achieving effluent reductions when defining BAT; however, they do not specifically require EPA to balance the cost of implementation against the pollution reduction benefit. The technology selected for BAT must be economically achievable [CWA section 301(b)(2)(A)]. EPA generally defines BAT on the basis of the performance associated with the best control and treatment measures that facilities in an industrial category are capable of achieving. Like BPT and BCT, other factors EPA must consider in assessing BAT include the age of equipment and facilities involved, the process employed, process changes, non-water quality environmental impacts, including energy requirements, and other such factors as the EPA Administrator deems appropriate [CWA section 304(b)(2)(B)]. The Agency retains considerable discretion in assigning the weight accorded to these factors. BAT limitations may be based on effluent reductions attainable through changes in a facility's processes and operations. Where existing performance is uniformly inadequate, BAT may reflect a higher level of performance than is currently being achieved within a subcategory on the basis of technology transferred from a different subcategory or category. BAT may be based on process changes or internal controls, even when those technologies are not common industry practice. See CWA sections 301(b)(2)(A), (C), (D) and (F) and 304(b)(2).

New Source Performance Standards (NSPS)

NSPS reflect effluent reductions that are achievable by direct dischargers based on the best available demonstrated control technology. New sources have the opportunity to install the best and most efficient production processes and wastewater treatment technologies at the time of construction. As a result, NSPS should represent the most stringent controls attainable through the application of the best available demonstrated control technology for all pollutants (i.e., conventional, nonconventional, and toxic pollutants). In establishing NSPS, EPA is directed to take into consideration the cost of achieving the effluent reduction and any non-water quality environmental impacts and energy requirements. See CWA section 306.

Pretreatment Standards for Existing Sources (PSES)

PSES are designed to prevent the discharge of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTWs, including incompatibility with the POTW's chosen biosolids (sewage sludge) disposal methods. The categorical pretreatment standards for existing indirect dischargers are technology-based and are analogous to BAT. The general pretreatment regulations, which set forth the framework for the implementation of national pretreatment standards, are at Part 403. See CWA section 307(b).

Pretreatment Standards for New Sources (PSNS)

Like PSES, PSNS are designed to prevent the discharges of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTWs. PSNS are to be issued at the same time as NSPS. New indirect dischargers have the opportunity to incorporate into their facilities the best available demonstrated technologies at the time of construction. The Agency considers the same factors in promulgating PSNS as it considers in promulgating NSPS. See CWA section 307(c).

EPA typically does not establish pretreatment standards for conventional pollutants (e.g., BOD_5, TSS, oil and grease) because POTWs are designed to treat such pollutants, but EPA has exercised its authority to establish categorical pretreatment standards for conventional pollutants as surrogates for toxic or nonconventional pollutants or to prevent interference. For example, EPA established categorical pretreatment standards for new and existing sources with a one-day maximum concentration of 100 mg/L oil and grease in the Petroleum Refining Point Source Category in Part 419 based on "the necessity to minimize [the] possibility of slug loadings of oil and grease being discharged to POTWs."[3]

The final statutory deadline for meeting BPT requirements was July 1, 1977, and the final statutory deadline for meeting BCT and BAT requirements was March 31, 1989. When applying applicable effluent guidelines, permit writers should note that they do not have the authority to extend the statutory deadlines in an NPDES permit; thus, all applicable technology-based requirements (i.e., effluent guidelines and case-by-case limitations based on BPJ) must be applied in NPDES permits without the benefit of a compliance schedule. In addition, though NSPS do not have specific dates as compliance deadlines, they are effective on the date the new source begins discharging. The facility must demonstrate compliance with NSPS within 90 days of discharge [see § 122.29(d)]. For more information on determining whether a discharge is subject to NSPS, see Appendix D of this manual. For additional information on the statutory and regulatory history of the NPDES program, see section 1.2 of this manual.

5.2.1.2 EPA's Development of Effluent Guidelines

EPA establishes national effluent guidelines for a specific industrial sector by regulation after considering an in-depth engineering and economic analysis of the industrial sector. EPA's Industrial Regulations Website <http://www.epa.gov/guide/industry.html> provides development documents for some specific industry categories (e.g., Iron and Steel Manufacturing and Metal Products and Machinery). Those documents contain additional information on how EPA develops effluent guidelines.

For each industrial sector, EPA assesses the performance and availability of the best pollution control technologies and pollution prevention practices that are available for an industrial category or subcategory. The effluent guidelines are promulgated for various industrial categories in 40 CFR, Chapter I, Subchapter N - Effluent Guidelines and Standards - Parts 400-471 <www.epa.gov/lawsregs/search/40cfr.html>.

In promulgating effluent guidelines, EPA may divide an industrial point source category into groupings of subcategories to provide a method for addressing variations between products, raw materials, processes, and other factors that result in distinctly different characteristics. Regulation of an industrial category using subcategories allows each subcategory to have a uniform set of requirements that take into account technological achievability and economic impacts unique to that subcategory. Grouping similar facilities into subcategories increases the likelihood that the regulations are practicable and diminishes the need to address variations between facilities within a category through a variance process. For more on variances, see section 5.2.2.7 below. EPA considers a number of different subcategorization factors during an effluent guidelines rulemaking, including the following:

- Manufacturing products and processes.
- Raw materials.
- Wastewater characteristics.
- Facility size.
- Geographical location.
- Age of facility and equipment.
- Wastewater treatability.

For each possible treatment technology option for an industry, EPA conducts an analysis of industry-wide incremental compliance costs, pollutant loadings and removals, and related non-water quality effects. The Agency also performs an economic analysis to assess the financial impact on the industry of implementing each option. That entire process involves data collection, rigorous data review, engineering analysis, and public comment. EPA selects a technology to serve as the *model* technology for pollutant removal for each required level of control (i.e., BPT, BCT, BAT, NSPS, PSES, and PSNS). Limitations and other requirements in the effluent guidelines for each level of control are based on application of the model technology to the category or subcategory of facilities.

Effluent guidelines are not always established for every pollutant present in a point source discharge. In many instances, EPA promulgates effluent guidelines for an *indicator* pollutant. Industrial facilities that comply with the effluent guidelines for the indicator pollutant will also control other pollutants (e.g., pollutants with a similar chemical structure). For example, EPA may choose to regulate only one of several metals present in the effluent from an industrial category, and compliance with the effluent guidelines will ensure that similar metals present in the discharge are adequately controlled. Additionally, for each industry sector EPA typically considers whether a pollutant is present in the process wastewater at treatable concentrations and whether the model technology for effluent guidelines effectively treats the pollutant. For example, see Figure 6-1 Pollutant of Concern Methodology <http://www.epa.gov/guide/cwt/final/develop/ch6.pdf> on page 6-4 of the *Centralized Waste Treatment category Technical Development Document*.

The CWA requires EPA to annually review existing effluent guidelines for both direct and indirect dischargers. CWA section 304(m) also requires EPA to publish an effluent guidelines program plan every 2 years. As part of the development of the biennial plan, the public is provided an opportunity to comment on a *preliminary* plan before it is finalized. The preliminary plan is published in odd-numbered years, and the final plan is published in even-numbered years. EPA encourages permit writers to participate in the effluent guidelines planning process and comment on the preliminary effluent guidelines program plans presented on the Effluent Guidelines Biennial Plan Website <www.epa.gov/guide/304m/index.html>.

5.2.1.3 Types of Limitations in Effluent Guidelines

Although the requirements in effluent guidelines generally are numeric limitations on the mass or concentration of a pollutant that can be discharged directly into waters of the United States, CWA section 502(11) defines *effluent limitation* broadly. This section describes several types of possible expressions for the limitations found in effluent guidelines. The permit writer should note that the limitations in effluent guidelines might need to be translated into an appropriate form to be included as effluent limitations in an NPDES permit. That process is discussed further in section 5.2.2 below.

Mass- or Concentration-based Numeric Limitations

Limitations in effluent guidelines generally are expressed as numeric values, which are upper bounds of the amount of pollutant that may be discharged. For most pollutants, these limitations are mass-based or concentration-based values. They are, in effect, measures of how well the production, wastewater treatment, and pollution prevention processes must be operated. In the course of developing effluent guidelines regulations, EPA uses data on a number of different pollutants from facilities with the selected model technologies to determine the appropriate numeric limitations. The limitations generally consist of upper bounds (maximum values) established for both the daily discharge and for the average monthly discharge.

In developing numeric limitations in effluent guidelines, EPA first determines an average performance level (the *long-term average*) that a facility with well-designed and operated model technologies reflecting the appropriate level of control is capable of achieving. That long-term average is calculated from data taken from facilities using the model technologies that were selected as a basis for the limitations. EPA expects that all facilities subject to the limitations will design and operate their treatment systems to achieve the long-term average performance level consistently because facilities with well-designed and operated model technologies have demonstrated that it can be done. The technical development document for the effluent guidelines usually identifies the long-term average for the model technologies; however, they generally are not part of the limitations in the effluent guidelines or TBELs in the permit. The limitations generally are expressed as maximum daily and average monthly limitations (see definitions in Exhibit A-2 in Appendix A of this document) that include an allowance for variability around the long-term average.

EPA acknowledges that process and treatment systems have inherent variability and, therefore, incorporates an allowance for this variation into the limitations specified in the effluent guidelines. That allowance is based on statistical analysis of the data from facilities using the model technologies. The limitations included in effluent guidelines incorporate all components of variability including shipping, sampling, storage, and analytical variability. By accounting for those reasonable excursions above the long-term average, the limitations in effluent guidelines generally are well above the actual long-term averages. If a facility operates its treatment system to meet the long-term average, EPA expects the facility will be able to meet the limitations specified in the effluent guidelines based on that long-term average.

EPA has different objectives in establishing maximum daily and average monthly limitations in effluent guidelines. In establishing maximum daily limitations, EPA's objective is to restrict the discharges on a daily basis at a level that is achievable for a facility that targets its treatment at the long-term average. In establishing average monthly limitations, EPA's objective is to provide an additional restriction to help

ensure that facilities target their average discharges in a manner that will achieve the long-term average. The average monthly limitation requires continuous dischargers to provide ongoing control on a monthly basis that complements controls imposed by the maximum daily limitation. To meet the average monthly limitation, a facility must counterbalance a value near the maximum daily limitation with one or more values well below the maximum daily limitation. To achieve compliance, the values must result in an average monthly value at or below the average monthly limitation. As explained below, EPA uses a smaller percentile basis for the average monthly limitation than the maximum daily limitation to encourage facilities to target their systems to a value closer to the long-term average.

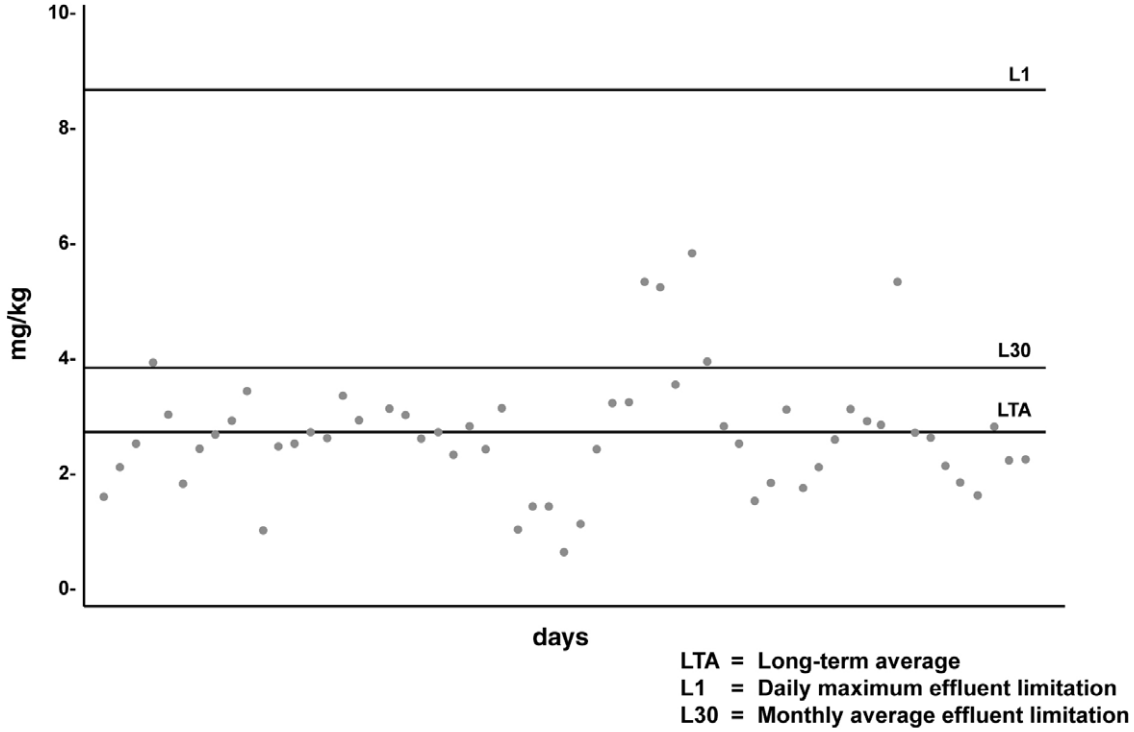
EPA generally uses statistical procedures to determine the values of the limitations specified in the effluent guidelines. Those procedures involve fitting effluent data to distributions and using estimated upper percentiles of the distributions. EPA defines the maximum daily limitation as an estimate of the 99th percentile of the distribution of the daily measurements. The average monthly limitation is an estimate of the 95th percentile of the distribution of the monthly averages of the daily measurements. EPA bases its limitations on percentiles chosen with the intention that they be high enough above the long-term average to accommodate reasonably anticipated variability within control of the facility. In conjunction with the statistical methods, EPA performs an engineering review to verify that the limitations are reasonable on the basis of the design and expected operation of the control technologies and the facility process conditions. Such limitations are translated into effluent limitations in a facility's NPDES permit. Facilities must comply with the effluent limitations in their permits at all times. EPA has prevailed in several judicial challenges to its selection of percentiles and on other issues related to limitations specified in effluent guidelines. [See, for example, *Chemical Manufacturers Association v. U.S. Environmental Protection Agency*, 870 F.2d 177, 230 (5th Cir. 1989) and *National Wildlife Federation, et al v. Environmental Protection Agency*, 286 F.3d 554 (D.C. Cir. 2002)]

Exhibit 5-9 depicts an example of TSS data for a facility that is operating around a required long-term average level for TSS. The dots represent daily measurements, and the reference lines show the values for the long-term average (LTA), the maximum daily limitation (L1), and the average monthly limitation (L30). The facility has demonstrated compliance with both the maximum daily and average monthly limitations. Daily measurements include values both above and below the long-term average; however, all the data values are below the maximum daily limitation. Some individual daily values exceed the average monthly limitation; however, within each month, the average of the daily values is less than the average monthly limitation.

EPA generally exercises four basic alternatives in setting mass- or concentration-based numeric limitations specified in effluent guidelines:

- Mass-based, production-normalized limitations (e.g., the pollutant discharge is not to exceed 1 pound per 1,000 pounds of production).
- Mass-based, flow-normalized limitations (e.g., the pollutant discharge is not to exceed the mass determined by multiplying the process wastewater flow subject to the effluent guideline by the concentration requirement in the guideline).
- Concentration-based limitations (e.g., the pollutant discharge is not to exceed 1 mg of pollutant per liter of wastewater).
- Limitations requiring *zero discharge* of specific pollutants or all pollutants.

Exhibit 5-9 Visual example of TSS LTA, maximum daily limitation and average monthly limitation



Except where a limitation requiring *zero discharge* of pollutants is applicable, EPA generally prefers setting production-normalized, mass-based limitations specified in effluent guidelines, where feasible, because production normalized limitations can reflect some expectation that the facility will conserve water and can reduce any potential for substituting dilution for treatment. EPA generally establishes concentration-based effluent guidelines when production and achievable wastewater flow cannot be correlated nationally. For example, in the Metal Finishing point source Category (Part 433), the Agency considered but decided against expressing the effluent guidelines as production-normalized mass-based effluent guidelines, "With the wide range of operations, product quality requirements, existing process configurations, and difficulties in measuring production, no consistent production normalizing relationship could be found. Concentration-based limits, however, can be consistently attained throughout the industry." [See 47 FR 38465, 31 August 1982.]

Numeric Limitations Established at Minimum Levels

Using percentile estimates to set limitations in effluent guidelines is not a requirement under the CWA. In some cases, the model technology for treating a pollutant might be capable of removing that pollutant to levels that cannot be reliably measured with existing analytical methods. EPA sometimes sets a requirement in the effluent guidelines that the concentration of a pollutant in the discharge must be below a *minimum level* or ML. The ML is the lowest level at which the entire analytical system must give a recognizable signal and an acceptable calibration point for the pollutant being analyzed. Where a limitation in the effluent guidelines is set at *less than the ML*, the value of the ML is specified in the effluent guidelines regulation on the basis of the analytical methods that EPA used to chemically analyze wastewaters in developing the regulation. For example, in the Pulp, Paper, and Paperboard point source

category (Part 430) the Daily Maximum BAT effluent guideline for the Tetrachlorodibenzofuran (TCDF) congener of dioxin is expressed as <*ML* for papergrade sulfite (Subpart E) mills, which means "less than the minimum level specified in part 430.01(i)" (i.e., 10 picograms/liter for TCDF). If, in the future, analytical methods become more sensitive with lower MLs, EPA would determine whether the technologies for reducing the amount of the pollutant in the discharge are capable of achieving more stringent limitations and, thus, whether it would be appropriate to modify the requirements of the effluent guideline.

EPA has not established average monthly limitations in effluent guidelines when the maximum daily limitation is an ML limitation. The purpose of an average monthly limitation is to require continuous dischargers to provide better control, on a monthly basis, than required by the maximum daily limitation. However, for these pollutants, the data were determined by analytical methods that could not measure below the ML specified in the regulations. Thus, even if a permitting authority requires monitoring for the pollutants more frequently than once a month, average monthly limitations would still be expressed as *less than the ML* or < *ML*.

Other Expressions for Numeric Limitations

EPA also promulgates effluent guidelines for pollutants that cannot be expressed in terms of mass or concentration (e.g., pH, temperature, radiation) or are better expressed through other means (e.g., unitless ratios). For example, pH is generally expressed as an acceptable range (e.g., 6.0–9.0 standard pH units).

Nonnumeric Effluent Limitations

In some cases, EPA includes nonnumeric or narrative effluent limitations rather than, or in addition to, numeric limitations in effluent guidelines. Nonnumeric effluent limitations might include specific BMPs or requirements to minimize or eliminate discharges. CWA sections 304(e), 308(a), 402(a), and 501(a) authorize the Administrator to prescribe BMPs as part of effluent guidelines and as part of an NPDES permit. CWA section 304(e) authorizes EPA to include supplemental BMPs in effluent guidelines for toxic or hazardous pollutants for the purpose of controlling "plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage." Several effluent guidelines include BMPs as requirements. Some effluent guidelines, such as the Concentrated Aquatic Animal Production point source category (Part 451), include the BMPs requirement exclusively. Section 9.1.2 of this manual further discusses BMPs.

CWA section 402(a)(1) and (2) and the NPDES regulations at § 122.44(k) also authorize BMPs in NPDES permits to control or abate the discharge of pollutants when numeric effluent limitations are infeasible, or when the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA.

Once EPA establishes effluent guidelines, the permit writer is responsible for translating the limitations and other requirements of the effluent guidelines into TBELs and other conditions appropriate for inclusion in an NPDES permit. Section 5.2.2 below discusses a step-by-step approach for applying effluent guidelines through NPDES permits.

5.2.2 Applying Effluent Guidelines through NPDES Permits

Permit writers need to have a detailed knowledge of the industrial facility applying for a new or reissued NPDES permit to identify applicable effluent guidelines and know how to use them to derive TBELs. This section provides a step-by-step procedure for applying effluent guidelines to direct discharges through NPDES permits as shown in Exhibit 5-10.

Exhibit 5-10 Steps for applying effluent guidelines to direct discharges

Step 1.	Learn about the industrial discharger
Step 2.	Identify the applicable effluent guidelines category(ies)
Step 3.	Identify the applicable effluent guidelines subcategory(ies)
Step 4.	Determine whether existing or new source standards apply
Step 5.	Calculate TBELs from the effluent guidelines
Step 6.	Account for overlapping or multiple effluent guidelines requirements
Step 7.	Apply additional regulatory considerations in calculating TBELs
Step 8.	Apply additional effluent guidelines requirements
Step 9.	Document the application of effluent guidelines in the fact sheet

5.2.2.1 Step 1: Learn About the Industrial Discharger

To write a defensible permit, the permit writer should have a solid understanding of the facility's operations. The permit writer should gather sufficient information to identify applicable effluent guidelines and derive TBELs. Facility-specific information the permit writer is likely to need includes the following:

- Industrial processes and raw materials.
- Products and services.
- Amount of manufacturing production or servicing.
- Number of production and non-production days.
- Current pollution prevention practices and wastewater treatment technology(ies).
- Discharge location of the wastewater pollutants and potential compliance sampling points.
- The source and characteristics of the wastewaters (including flow) and pollutants that are being discharged or have the potential to be discharged from the facility.

Sources of information include the facility's permit application, the current permit and fact sheet (if the facility is permitted), discharge monitoring reports, site visits, site inspections (such as compliance evaluation inspections for an existing permit), and other information submitted by the facility. The permit writer also should identify any information that would assist in determining whether the facility or part of the facility is considered a new source (e.g., age of facility and equipment).

5.2.2.2 Step 2: Identify the Applicable Effluent Guidelines Category(ies)

As noted above, EPA's effluent guidelines are at 40 CFR, Chapter I, Subchapter N - Effluent Guidelines and Standards, Parts 400–471 <www.epa.gov/lawsregs/search/40cfr.html>. A summary of promulgated effluent guidelines is presented on EPA's Industrial Regulations Website <www.epa.gov/guide/industry.html> and in Exhibit 5-11 below.

Exhibit 5-11 Table of existing point source categories (June 2010)

Industry category (listed alphabetically)	40 CFR Part	Industry category (listed alphabetically)	40 CFR Part
Aluminum Forming	467	Meat and Poultry Products	432
Asbestos Manufacturing	427	Metal Finishing	433
Battery Manufacturing	461	Metal Molding and Casting	464
Canned and Preserved Fruits and Vegetable Processing	407	Metal Products and Machinery	438
Canned and Preserved Seafood Processing	408	Mineral Mining and Processing	436
Carbon Black Manufacturing	458	Nonferrous Metals Forming and Metal Powders	471
Cement Manufacturing	411	Nonferrous Metals Manufacturing	421
Centralized Waste Treatment	437	Oil and Gas Extraction	435
Coal Mining	434	Ore Mining and Dressing	440
Coil Coating	465	Organic Chemicals, Plastics, and Synthetic Fibers	414
Concentrated Animal Feeding Operations (CAFOs)	412	Paint Formulating	446
Concentrated Aquatic Animal Production	451	Paving and Roofing Materials (Tars and Asphalt)	443
Copper Forming	468	Pesticide Chemicals	455
Dairy Products Processing	405	Petroleum Refining	419
Electrical and Electronic Components	469	Pharmaceutical Manufacturing	439
Electroplating*	413	Phosphate Manufacturing	422
Explosives Manufacturing	457	Photographic	459
Ferroalloy Manufacturing	424	Plastic Molding and Forming	463
Fertilizer Manufacturing	418	Porcelain Enameling	466
Glass Manufacturing	426	Pulp, Paper, and Paperboard	430
Grain Mills	406	Rubber Manufacturing	428
Gum and Wood Chemicals	454	Soaps and Detergents Manufacturing	417
Hospitals	460	Steam Electric Power Generating	423
Ink Formulating	447	Sugar Processing	409
Inorganic Chemicals	415	Textile Mills	410
Iron and Steel Manufacturing	420	Timber Products Processing	429
Landfills	445	Transportation Equipment Cleaning	442
Leather Tanning and Finishing	425	Waste Combustors	444

* This category contains only categorical pretreatment standards (no effluent guidelines for direct dischargers).

The following sources of information might be helpful in identifying applicable effluent guidelines for a facility:

- **CFR titles and applicability section of the effluent guidelines**. This is first place to look for information for identifying applicable effluent guidelines. Each effluent guidelines regulation includes an applicability section for the category or each subcategory of the industry. The applicability section gives a general description of the types of facilities regulated by the effluent guidelines. The applicability sections often define certain industrial operations or other criteria (e.g., production or process wastewater flow thresholds) that identify whether a facility is regulated by the effluent guidelines.

- **North American Industry Classification System (NAICS) and Standard Industrial Classification (SIC)**. The current NAICS <www.census.gov/epcd/www/naics.html> and former SIC codes <www.census.gov/epcd/www/naicstab.htm> could be helpful to determine the appropriate industrial category(ies) for a facility. NAICS and SIC codes were developed and are maintained by the federal government as a way to classify establishments by type of activity for comparing economic and other types of facility-specific data. Although SIC codes provide a helpful starting point for categorizing a facility, permit writers should be cautious of relying exclusively on SIC codes for determining the appropriate industrial category. SIC codes were not developed using EPA's industrial classification scheme, or vice versa, and, therefore, the codes might not always correspond exactly with the categorization process. In addition, more than one SIC code might apply to a single facility. Item V-II of NPDES Application Form l requires that the applicant provide the SIC code for the activity covered by the permit application. In some instances, the SIC code will identify both the industrial category and the subcategory of a facility. Sometimes the SIC code might identify the appropriate industrial category but not the subcategory. Exhibit 5-12 presents two examples of how a permit writer might identify the applicable effluent guidelines using the facilities SIC codes.

Exhibit 5-12 Examples of identifying applicable effluent guidelines using SIC codes

Example 1

A facility that performs the primary smelting and refining of copper reports SIC code 3331 in its NPDES permit application. By scanning the list of industrial point source categories, the permit writer can determine that the facility is regulated by effluent guidelines in the Nonferrous Metals Manufacturing point source category (Part 421). In this case, the SIC code also indicates that the facility is likely regulated by effluent guidelines in the Primary Copper Smelting Subcategory.

Example 2

A facility that manufactures ethyl acrylate and 2-ethylhexyl acrylate (acrylic acid esters) reports the SIC code 2869 (Industrial Organic Chemicals, Not Elsewhere Classified) in its NPDES permit application. By scanning the list of industrial point source categories, the permit writer can determine that facility is likely regulated by effluent guidelines in the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) category (Part 414).

- **EPA's Development Documents and Compliance Guides**. EPA produces a number of documents that will aid permit writers in identifying applicable effluent guidelines and incorporating them into NPDES permits. In particular, development documents summarize the data and information EPA used to develop the effluent guidelines. Such documents are extremely useful in identifying the applicability of the effluent guidelines and how to incorporate the effluent guidelines into NPDES permits. EPA may also publish a compliance guide for permit writers and industry. EPA's Effluent Guidelines Website <www.epa.gov/guide/> provides available documents for specific industrial categories.

- **FR Notices**. The preamble text to the FR notices containing the proposed and final effluent guidelines rulemakings also provide additional insight into applicability of the effluent guidelines. EPA's Effluent Guidelines Website <www.epa.gov/guide/> provides FR notices for specific industrial categories. For example, the preambles to recently promulgated effluent guidelines typically list the SIC and NAICS codes for the potentially regulated facilities. Each Part in the CFR identifies the relevant FR notices. For example, § 419.11 (i.e., specialized definitions for

Subpart [subcategory] A for the Petroleum Refining point source category) identifies 47 FR 46446, October 18, 1982, as amended at 50 FR 28522, July 12, 1985, as its source.

- **EPA Industry Experts**. EPA has a number of subject matter experts <www.epa.gov/guide/contacts.html> at its headquarters office in Washington, D.C. that are available to answer questions on specific effluent guidelines. EPA's NPDES Contacts in Regional Offices <www.epa.gov/npdes/regionalcontacts> also offer assistance in sorting through the different effluent guidelines and NPDES regulations.

- **EPA's Effluent Guidelines Planning Support Documents.** EPA's Effluent Guidelines Biennial Plan Website <www.epa.gov/guide/304m> provides technical support documents and other information supporting EPA's biennial effluent guidelines program plans.

- **EPA's Sector Notebooks.** EPA's Sector Notebooks <www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/index.html> describe specific U.S. industries and governments and provide a holistic approach by integrating processes, applicable regulations, and other relevant environment information.

- **Other Sources**. Other sources of information include resources identified below in Exhibit 5-23, BPJ Permitting Tools. Permit and fact sheet and information from similar facilities might aid in identifying applicable effluent guidelines. However, the permit writer should not assume that a similar facility was correctly categorized in its permit and should examine the rationale for how the other permit writer identified any applicable effluent guidelines before relying on another permit to identify the applicable category.

Permit writers should be aware that effluent guidelines from two or more industrial point source categories might apply to a single facility. Step 6 below, provides additional information on overlapping or multiple effluent guidelines requirements.

5.2.2.3 Step 3: Identify the Applicable Effluent Guidelines Subcategory(ies)

In promulgating effluent guidelines, EPA may divide an industrial point source category into groupings called *subcategories* to provide a method for addressing variations between products, raw materials, processes, and other factors that result in distinctly different effluent characteristics or treatment options. Some effluent guidelines categories cover a variety of industrial sectors (e.g., the Nonferrous Metals Manufacturing point source category has 31 subcategories). It is important for the permit writer to correctly identify the applicable subcategory to derive TBELs.

The process of identifying the applicable effluent guidelines requires close review and comparison of information obtained from Step 1 and Step 2 above. Just as effluent guidelines from two or more industrial categories can apply to a single facility, it also is true that requirements from two or more subcategories could apply to a single facility.

Exhibit 5-13 presents two examples of how a permit writer can identify the subcategory containing the applicable effluent guidelines using information from the NPDES permit application.

Exhibit 5-13 Examples of identifying the subcategory with the applicable effluent guidelines

Example 1

A permit writer has identified the facility from Example 2 in Exhibit 5-12 above as potentially regulated by the effluent guidelines in the OCPSF point source category (Part 414) <www.epa.gov/guide/ocpsf/>. The permit writer can determine from a further review of the industrial categorization discussion in the *OCPSF Development Document* and the guidance document that the facility is likely subject to effluent guidelines in Subpart G (Bulk Organic Chemicals). Specifically, the applicability criteria section in Subpart G (§ 414.70) states, "The provisions of this subpart are applicable to the process wastewater discharges resulting from the manufacture of the following: SIC 2865 and 2869 bulk organic chemicals and bulk organic chemical groups." Further, acrylic acid esters are listed in § 414.70 as an OCPSF product group.

Example 2

A large poultry slaughterhouse annually produces 200 million pounds of whole, halved, quarter or smaller meat cuts and reports SIC Code 2015 in its NPDES permit application. The permit writer reviewed the list of effluent guidelines and identified that the facility is likely regulated by effluent guidelines in the Meat and Poultry Products point source category (Part 432) <www.epa.gov/guide/mpp/>. The permit writer reviewed the preamble to the final effluent guidelines rule and the rule's development document. In that effluent guidelines regulation, EPA used NAICS codes to assist in applicability decisions. See 69 FR 54475, September 8, 2004. The permit writer used the U.S. Census Bureau's SIC to NAICS crosswalk website <www.census.gov/epcd/www/naicstab.htm> to identify the NAICS code (311615). Using the NAICS code, the permit writer can narrow the list of potentially applicable subcategories to the Poultry First Processing (Subpart K) or the Poultry Further Processing (Subpart L) subcategories. After reviewing the applicability criteria of both subcategories, the permit writer determined that only the effluent guidelines in Subpart K are likely applicable because the facility performs slaughtering operations, which are not regulated by Subpart L. Finally, the permit writer also needed to compare the average annual production of the facility (200 million pounds) with the production threshold in the effluent guidelines (100 million pounds per year). Because the facility produces more than the production threshold, the effluent guidelines in Subpart K are applicable to this facility. See §§ 432.112 and 432.113. In this example the permit writer would use the effluent guidelines for ammonia (as N), BOD_5, fecal coliform, oil and grease (as HEM), TSS, and total nitrogen to derive effluent limitations as detailed in section 5.2.2.5 below.

5.2.2.4 Step 4: Determine whether Existing or New Source Standards Apply

Section 5.2.1.1 above defines the different control technologies that apply to direct dischargers: BPT, BCT, BAT, and NSPS. The first three apply to existing direct dischargers, and the fourth to new sources. To determine whether existing source standards (i.e., BPT, BCT, and BAT) or NSPS apply to the facility, the permit writer must determine whether the facility or any part of the facility is a new source. A new source is defined in § 122.2 as a building, structure, facility, or installation that discharges pollutants or could discharge pollutants and for which construction began after promulgation of the applicable effluent guidelines or after proposal of the applicable effluent guidelines, but only if the effluent guidelines are promulgated within 120 days. Thus, the discharger's entire facility could be subject to new source standards (e.g., a brand new facility). Permit writers should note that the new source date for indirect dischargers is the date on which the pretreatment standard for new sources is proposed. See §403.3(m)(1).

Additional criteria for determining whether a discharge is a new source are defined in § 122.29(b) to cover situations where a facility is adding a new building or process line that results in a discharge to the waters of the United States. Such an addition would result in a new source if any of the following is true for the source:

- Is constructed at a site at which no other source is located.
- Totally replaces the process causing the discharge from an existing source.
- Has processes that are substantially independent of an existing source at the same site.

Furthermore, some effluent guidelines, such as the effluent guidelines for the Pulp, Paper, and Paperboard Point Source Category in Part 430, include additional criteria for making new source determinations. See § 430.01(j).

Appendix D of this manual provides the applicable new source dates used in making new source determinations by effluent guideline category as provided in Appendix B of the EPA memorandum *New Source Dates for Direct and Indirect Dischargers*[4] <www.epa.gov/npdes/pubs/newsource_dates.pdf> sent by the directors of the Water Permits Division and the Engineering and Analysis Division to the Regional Water Division Directors. Permit writers can use Appendix D of this manual to find the date for determining whether a facility or part of a facility is subject to NSPS.

Where a new source is the result of a new installation of process equipment at an existing facility, part of the facility might be subject to existing source standards and other parts of the facility subject to new source standards. Permit writers should identify whether the facility has installed any process equipment after the last issuance of the NPDES permit and apply the criteria from § 122.29(b) on a case-by-case basis to new construction or new processes, while applying existing source requirements to the existing portions of the facility. Sometimes it can be difficult to distinguish between a new source and a modification or alteration of an existing source, especially when modifications have occurred slowly over time. The permit writer should consult the effluent guidelines regulation to determine if it defines more specifically what constitutes a new source.

It is important to remember that after the effective date of a new source standard, the CWA stipulates that it is unlawful for any owner or operator to operate such a source in violation of those standards. See 33 U.S.C. 1316(e) and 1317(d). EPA's regulations specify that a new source "[must] install and have in operating condition, and [must] *start up* all pollution control equipment" required to meet applicable standards before beginning to discharge. The regulations also indicate that the owner or operator of a new source must meet all applicable standards within "the shortest feasible time (not to exceed 90 days)." See § 122.29(d)(4).

In addition to the requirement to meet NSPS upon beginning to discharge, an EPA-issued NPDES permit for a new source is a federal action subject to the requirements of the National Environmental Policy Act (NEPA), 33 U.S.C. 1371(c)(1). For more information on NEPA and the NPDES program, see section 11.1.2 of this manual.

For existing facilities and existing sources (where NSPS do not apply), existing source standards (i.e., BPT, BCT, BAT) apply. The permit writer would use the more stringent technology level of control for each pollutant. For example, the BPT level of control in the Veneer Subcategory of the Timber Products Processing category (Part 429, Subpart B) allows a discharge of process wastewater and identifies effluent guidelines for BOD_5 and pH, while the BAT level of control bans the direct discharge of process wastewater. Consequently, the NPDES permit for a facility regulated by the Veneer Subcategory must use the more stringent BAT requirements and prohibit the direct discharge of process wastewater. The effluent guidelines for the Renderers subcategory of the Meat and Poultry Products point source category (Subpart J, Part 432) provide another example. In those effluent guidelines, the BCT requirements for BOD_5, oil and grease, and TSS are more stringent than the corresponding BPT requirements. Accordingly, the permit writer would use the more stringent BCT requirements, rather than the BPT requirements, to derive numeric permit limitations for an existing renderer.

5.2.2.5 Step 5: Calculate TBELs from the Effluent Guidelines

Once a permit writer has identified the effluent guidelines that apply to a facility, he or she then uses those effluent guidelines to calculate applicable TBELs.

EPA's regulations at § 122.45(f)(1) stipulate that all pollutants limited in permits must have limitations, standards or prohibitions expressed in terms of mass except under any of the following conditions:

- For pH, temperature, radiation, or other pollutants that cannot appropriately be expressed by mass limitations.
- When applicable standards or limitations are expressed in terms of other units of measure.
- If in establishing technology-based permit limitations on a case-by-case basis, limitations based on mass are infeasible because the mass or pollutant cannot be related to a measure of production (e.g., discharges of TSS from certain mining operations). The permit conditions must ensure that dilution will not be used as a substitute for treatment.

Thus, the type of limitation (i.e., mass, concentration, or other units) calculated for a specific pollutant at a facility will depend on the type of pollutant and the way limitations are expressed in the applicable effluent guideline. Generally, effluent guidelines include both maximum daily and monthly average limitations for most pollutants. Though the effluent guidelines use different terms for monthly effluent limitations (e.g., monthly average, maximum for monthly average, average of daily values for 30 consecutive days), the requirements are expressed in NPDES permits as average monthly limitations as defined in § 122.2.

As stated in Steps 1 and 2 above, the permit writer would use many sources of information to calculate TBELs. From those sources, the permit writer should identify the source and characteristics of the wastewaters (including flow) and pollutants being discharged, or that have the potential to be discharged, and whether and how those pollutants are regulated by effluent guidelines. In particular, the permit writer should identify the following:

- The appropriate permit compliance point(s) (which might be specified in the effluent guidelines).
- Wastewaters subject to the applicable effluent guidelines and whether they are commingled with other wastewaters not regulated by effluent guidelines (e.g., sanitary wastewaters before the permit compliance point).
- Reasonable measure of the facility's actual long-term daily production and average number of production days per year regulated by effluent guidelines (necessary for derived effluent limitations from production-normalized effluent guidelines).
- Average daily facility flows at the compliance point(s) regulated by effluent guidelines.
- Average daily facility flows at the compliance point(s) not regulated by effluent guidelines.

That information is used in conjunction with the effluent guidelines for TBEL calculations as discussed below.

Calculating Mass-based TBELs from Production-Normalized Effluent Guidelines

Most effluent guidelines requirements are mass-based and expressed in terms of allowable pollutant discharge per unit of production or some other measure of production (i.e., production normalized). Permit writers incorporate such production-normalized effluent guidelines into NPDES permits as mass-based TBELs by using a reasonable measure of the permittee's actual long-term daily production. The objective in determining the production for a facility is to develop a single estimate of the long-term average daily production that can reasonably be expected to prevail during the next term of the permit (i.e., not the design production rate). Permit writers may establish such a production rate using the past 3 to 5 years of facility data. For example, the permit writer might wish to use the average daily production rate calculated using the highest annual production from the previous 3 to 5 years. Whatever value is selected, the permit writer should ensure that the production rate used in deriving mass-based effluent limitations is representative of the actual production likely to prevail during the next term of the permit.

The examples in Exhibit 5-14 illustrate the application of production-based effluent guidelines using the approach where annual production data are available. In Example 1 in Exhibit 5-14, the highest annual production rate during the past 5 years was used as the estimate of production. If historical trends, market forces, company plans to decrease production, or plant designs and capital expenditures for an increase in production indicated that a different level of production would prevail during the permit term, the permit writer could consider a different basis for estimating production or establish tiered discharge limitations, as discussed in section 5.2.2.7 below.

Calculating Mass-based TBELs from Flow-Normalized Effluent Guidelines

In some cases, permit writers are directed to calculate mass-based TBELs from flow-normalized effluent guidelines that are expressed as concentrations. For example, the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) effluent guidelines <www.epa.gov/waterscience/guide/ocpsf/> in Part 414 state that facilities "must achieve discharges not exceeding the quantity (mass) determined by multiplying the process wastewater flow subject to [the effluent guideline] times the concentration listed in the [effluent guideline]…" The *Development Document for Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics and Synthetic Fibers Point Source Category*[5] <www.epa.gov/waterscience/guide/ocpsf/#guidance> directs the permit writer to "use a reasonable estimate of process wastewater discharges and the concentration limitations [in the effluent guideline] to develop mass limitations for the NPDES permit." Thus, the process for calculating the TBELs is similar to the process used with production-normalized effluent guidelines, but rather than using a reasonable measure of the actual daily production, the permit writer would use a reasonable measure of the actual daily flow rate as the basis for calculating the TBELs.

As with estimating production to calculate TBELs, the objective in determining a flow estimate for a facility is to develop a single estimate of the actual daily flow rate (in terms of volume of process wastewater per day), which can reasonably be expected to prevail during the next term of the permit (i.e., not the design flow rate). Permit writers can establish that flow rate using the past 3 to 5 years of facility data in a manner similar to the method used to determine production. For example, the permit writer might wish to use the highest average daily flow rate from the average daily flows calculated for each of the past 3 to 5 years. The value selected should be representative of the actual flow likely to prevail during the next term of the permit.

Exhibit 5-14 Example of calculating mass-based effluent limitation from production-normalized effluent guidelines[6]

Example 1

Facility A has produced 331,000 tons, 301,500 tons, 321,500 tons, 330,000 tons, and 331,500 tons of product per year for the previous 5 years operating 255 days per year.

Question:
What would be a reasonable measure of production for permitting purposes?

Answer:
Using the highest year of production (331,500 tons per year) might be an appropriate and reasonable measure of production, if this figure is representative of the actual production expected to occur over the next term of the permit. Permit writers also should check to see if the maximum yearly value is within a certain percentage (e.g., 20 percent–see section 5.2.2.7 below) of the average value. In evaluating gross production figures, the number of production days should be considered. If the number of production days per year is not comparable, the permit writer would need to convert the numbers to production per day before comparing them. In this example, all the yearly production figures were based on 255 days per year of production, so they may be compared directly. The 331,500 tons per year figure is the maximum for the past 5 years, which is only 2.6 percent above the average annual production of 323,100 tons. Therefore, 331,500 tons is a reasonable measure of the annual production for the facility.

Example 2

For the same facility in Example 1 above with an annual production of 331,500 tons, the production-normalized effluent guidelines for zinc are 0.1 lbs/1,000 lbs as monthly average and 0.15 lbs/1,000 lbs as daily maximum.

Question:
What are the resulting zinc technology-based effluent limitations for the NPDES permit?

Answer:
The annual production would be converted to an average daily production rate to apply the effluent guidelines. To convert from the annual production rate to an average daily rate, divide the annual production rate by the number of production days per year. To determine the number of production days, subtract the total number of normally scheduled non-production days from the total days in a year. Because Company A normally has 255 production days per year, the annual production rate of 331,500 tons per year would yield an average production daily rate of 1,300 tons per day.

Monthly average discharge limitation for zinc*:

1,300 tons/day	x	2,000 lbs/ton	x	0.10 lbs/1,000 lbs	=	**260 lbs/day**

Daily maximum discharge limitation for zinc*:

1,300 tons/day	x	2,000 lbs/ton	x	0.15 lbs/1,000 lbs	=	**390 lbs/day**

* calculated to 2 significant figures

Calculating TBELs from Concentration-based Effluent Guidelines

Permit writers might want to develop mass-based limitations for facilities with concentration-based effluent guidelines (e.g., for a facility does not have adequate water conservation practices). Mass-based permit effluent limitations encourage water conservation (e.g., minimize the potential for diluting process wastewaters by non-process wastewater, more efficient use of water) and pollution prevention (e.g., reduce waste loads to wastewater treatment facilities by physically collecting solid materials before using water to clean equipment and facilities). Additionally, for facilities with on-site wastewater treatment systems, the combination of water-reduction technologies and practices and well-operated wastewater treatment will reduce the volume and mass of discharged wastewater pollution (i.e., after treatment). Another benefit of mass-based permit effluent limitations is that they provide the permittee with more flexibility. Permittees may elect to control their wastewater discharges through more efficient wastewater control technologies and pollution-prevention practices that result in lower pollutant concentrations in the

discharged wastewater, or more efficient water conservation practices that result in less wastewater volume discharged from industrial operations), or both.

"EPA strongly supports water conservation and encourages all sectors, including municipal, industrial, and agricultural, to achieve efficient water use. EPA does not intend for its regulations to present a barrier to efficient water use in any industrial sector." See final 2006 Effluent Guidelines Program Plan in 71 FR 76655, December 21, 2006.

When calculating mass-based effluent limitations, the permit writer should use a conversion factor and document in the fact sheet the conversion factors used to calculate the permit limitations (e.g., concentration [mg/L] × flow [mgd] × 8.34 [conversion factor] = permit limitation [lbs/day]).

Additionally, guidance for implementing concentration-based limitations in effluent guidelines may direct permit writers to develop mass-based TBELs. For example, the *Permit Guidance Document Transportation Equipment Cleaning Point Source Category (40 CFR 442)*[7] industry states:

> The effluent limitations guidelines and standards for the TEC industry are concentration-based and adhere to the *building block* concept. Each regulated wastestream in an outfall is typically assigned a mass-based discharge allowance based on a calculation of its applicable concentration-based limitation and annual average flow. The sum of the allowances is the total mass discharge allowance for the outfall. In other words, the applicable permit limitations for facilities in more than one subcategory is the sum of the mass loadings based upon production in each subcategory and the respective subcategory effluent limitations guidelines. Mass-based limitations for unregulated or dilution wastewater streams at direct discharging facilities are established using [BPJ].

Where a permit writer cannot determine a reasonable measure of actual flow for a regulated discharge, concentration-based TBELs may be determined by directly applying the concentration-based limitations in effluent guidelines to the regulated flow and accounting for non-regulated flows at the point of compliance for the TBELs.

Supplementing Mass-based TBELs with Concentration Limitations

Even where effluent guidelines require permit writers to calculate mass-based TBELs, a permit writer may determine that it is beneficial to include concentration-based limitations to supplement the mass-based limitations. Where effluent limitations are expressed in terms of mass, a provision at § 122.45(f)(2) allows the permit writer, at his or her discretion, to express limitations in additional units (e.g., concentration units). Where limitations are expressed in more than one unit, the permittee must comply with both. The permit writer may determine that expressing limitations in terms of both concentration and mass encourages the proper operation of a treatment facility at all times.

Supplementing mass-based limitations with concentration-based limitations may be especially appropriate where the requirements in the effluent guidelines are flow-normalized (i.e., the effluent guidelines includes a concentration requirement but directs the permit writer to calculate a mass-based TBEL using the concentration requirement and the wastewater flow). The permit writer may determine that if the permit includes only mass-based limitations derived from the concentration-based limitations in the effluent guidelines, a permittee could increase its effluent pollutant concentrations above the applicable concentration requirements during low flow periods (i.e., reduce the efficiency of the wastewater

treatment) and still meet its mass-based permit limitations. Supplementing the mass-based TBELs with concentration limitations would discourage the reduction in treatment efficiency during low-flow periods and require proper operation of treatment units at all times.

Incorporating Narrative Requirements from Effluent Guidelines

The permit writer should also ensure that any applicable narrative effluent guidelines controls or requirements are included in the permit. For example, the effluent guidelines for Concentrated Aquatic Animal Production facilities (Part 451) consist of narrative requirements implemented through BMPs. Another example, related to monitoring and compliance rather than effluent limitations, is found in the Metal Finishing effluent guidelines. The effluent guidelines allow a facility to make a statement regarding total toxic organics (TTO) in lieu of monitoring for toxic organics. Exhibit 5-15 provides an example narrative requirement representing BPT performance standards for Concentrated Aquatic Animal Production facilities, Subpart A (flow through and recirculating systems) § 455.11(a).

Exhibit 5-15 Example narrative requirement from the Concentrated Aquatic Animal Production effluent guideline—Subpart A [§ 455.11(a)]

Except as provided in [§§] 125.30 through 125.32, any existing point source subject to this subpart must meet the following requirements, expressed as practices (or any modification to these requirements as determined by the permitting authority based on its exercise of its best professional judgment) representing the application of BPT:

(a) Solids control. The permittee must:

(1) Employ efficient feed management and feeding strategies that limit feed input to the minimum amount reasonably necessary to achieve production goals and sustain targeted rates of aquatic animal growth in order to minimize potential discharges of uneaten feed and waste products to waters of the [United States]

(2) In order to minimize the discharge of accumulated solids from settling ponds and basins and production systems, identify and implement procedures for routine cleaning of rearing units and off-line settling basins, and procedures to minimize any discharge of accumulated solids during the inventorying, grading and harvesting aquatic animals in the production system.

(3) Remove and dispose of aquatic animal mortalities properly on a regular basis to prevent discharge to waters of the [United States], except in cases where the permitting authority authorizes such discharge in order to benefit the aquatic environment.

5.2.2.6 Step 6: Account for Overlapping or Multiple Effluent Guidelines Requirements

There are instances when one facility includes both new and existing sources, produces multiple products or services, or includes production or services belonging to more than one category or subcategory. In such cases, the permit writer must examine the applicable effluent guidelines closely to ensure that (1) one guideline does not supersede another; and (2) the effluent guidelines are properly applied.

Superseding Effluent Guidelines

EPA tries to minimize the overlap of different effluent guidelines by providing exclusions in the applicability sections. The effluent guidelines in the Metal Finishing point source category (Part 433) are an example of where EPA has tried to minimize the overlap of multiple effluent guidelines for certain wastewater discharges. Exhibit 5-16 presents the applicability section in Part 433 [§ 433.10(b)], which specifically excludes certain wastewaters from the Metal Finishing effluent guidelines. Another example

is the preamble to the OCPSF effluent guidelines. The preamble identifies numerous circumstances where the OCPSF regulations are superseded by effluent guidelines for other industrial categories. Exhibit 5-17 presents excerpts from the preamble (52 FR 42523, November 5, 1987) to illustrate the point.

Exhibit 5-16 Exclusion of wastewaters in metal finishing effluent guidelines

In some cases, effluent limitations and standards for the following industrial categories might be effective and applicable to wastewater discharges from the metal finishing operations listed above [in paragraph (a)]. In such cases these Part 433 limitations shall not apply and the following regulations shall apply: [emphasis added]

- Nonferrous metal smelting and refining (40 CFR part 421)
- Coil coating (40 CFR Part 465)
- Porcelain enameling (40 CFR Part 466)
- Battery manufacturing (40 CFR Part 461)
- Iron and steel (40 CFR Part 420)
- Metal casting foundries (40 CFR Part 464)
- Aluminum forming (40 CFR Part 467)
- Copper forming (40 CFR Part 468)
- Plastic molding and forming (40 CFR Part 463)
- Nonferrous forming (40 CFR Part 471)
- Electrical and electronic components (40 CFR Part 469)

Exhibit 5-17 Excerpts from preamble to OCPSF effluent guidelines regarding applicability of effluent guidelines

- For the purposes of this regulation, OCPSF process wastewater discharges are defined as discharges from all establishments or portions of establishments that manufacture products or product groups listed in the applicability sections of this regulation, and are included within the following U.S. Department of Commerce Bureau of the Census Standard Industrial Classification (SIC) major groups:
  - SIC 2865: Cyclic Crudes and Intermediates, Dyes, and Organic Pigments,
  - SIC 2869: Industrial Organic Chemicals, not Elsewhere Classified.
  - SIC 2821: Plastic Materials, Synthetic Resins, and Nonvulcanizable Elastomers.
  - SIC 2823: Cellulosic Man-Made Fibers, and
  - SIC 2824: Synthetic Organic Fibers, Except Cellulosic.

  The OCPSF regulation does not apply to process wastewater discharges from the manufacture of organic chemical compounds solely by extraction from plant and animal raw materials or by fermentation processes.
- The OCPSF regulation does not apply to discharges from OCPSF product/process operations [that] are covered by the provisions of other categorical industry effluent limitations guidelines and standards if the wastewater is treated in combination with the non-OCPSF industrial category regulated wastewater. (Different processes manufacture some products or product groups and some processes with slight operation condition variations give different products. EPA uses the term *product/process* to mean different variations of the same basic process to manufacture different products as well as to manufacture the same product using different processes.)
- The process wastewater discharges by petroleum refineries and pharmaceutical manufacturers from production of organic chemical products specifically covered by 40 CFR Part 419 Subparts C and E and Part 439 Subpart C, respectively, that are treated in combination with other petroleum refinery or pharmaceutical manufacturing wastewater, respectively, are not subject to the OCPSF regulation no matter what SIC code they use to report their products.
- Today's OCPSF category regulation applies to plastics molding and forming processes when plastic resin manufacturers mold or form crude intermediate plastic material for shipment off-site. The regulation also applies to the extrusion of fibers. Plastics molding and forming processes, other than those described above are regulated by the Plastics Molding and Forming effluent guidelines and standards (40 CFR Part 463).

Exhibit 5-17 Excerpts from preamble to OCPSF effluent guidelines regarding applicability of effluent guidelines

- Public comments requested guidance relating to the coverage of OCPSF research and development facilities, standalone OCPSF research and development, pilot plant, technical service, and laboratory bench scale-operations are not covered by the OCSPF regulation. However, wastewater from such operations conducted in conjunction with and related to existing OCPSF manufacturing operations at OCPSF facilities is covered by the OCPSF regulation because these operations would most likely generate wastewater with characteristics similar to the commercial manufacturing facility. Research and development, pilot plant technical service, and laboratory operations [that] are unrelated to existing OCPSF plant operations, even though conducted on-site, are not covered by the OCPSF regulation because they may generate wastewater with characteristic dissimilar to that from the commercial OCPSF manufacturing facility.
- Finally, as described in the following paragraphs, this regulation does not cover certain production that has historically been reported to the Bureau of Census under a non-OCPSF SIC subgroup heading, even if such production could be reported under one of the five SIC code groups covered by today's regulation.

Multiple Effluent Guidelines Requirements

NPDES permit writers often find that a facility employs multiple processes each with its own effluent guidelines requirement. In addition, sometimes effluent guidelines from multiple categories and subcategories apply to wastewaters for a single facility. When a facility is subject to effluent guidelines for two or more processes in a subcategory or to effluent guidelines from two or more categories or subcategories, the permit writer must apply each of the applicable effluent guidelines to derive TBELs. In applying multiple effluent guidelines, the permit writer should use measures of actual production or flow that are reasonable with respect to operation of multiple processes at the same time. For example, if maximum production for one process can occur only when there is reduced production for a second process, it might not be reasonable to assume maximum production levels for both processes at the same time when applying the effluent guidelines. If all wastewaters regulated by effluent guidelines are treated separately but are combined before the discharge, the permit writer may establish internal outfalls and separately apply the effluent guidelines at the respective internal outfall as discussed in § 122.45(h) and in Step 7 below.

More commonly, wastewater streams regulated by effluent guidelines are combined during or before treatment. In such a case, the permit writer combines the allowable pollutant loadings from each set of requirements or from each set of effluent guidelines to arrive at a single TBEL for the facility using a *building block* approach. The building block approach as applied to a facility with multiple processes in the Primary Tungsten subcategory of the Primary Nonferrous Metals Manufacturing point source category (Part 421, Subpart J) is presented in Exhibit 5-18. The same principles illustrated in the exhibit would apply to a facility with processes subject to requirements from multiple subcategories or categories that are combined before or during treatment.

Exhibit 5-18 Building block approach for applying effluent guidelines

A facility is subject to Part 421, Subpart J (Primary Tungsten). The facility uses a tungstic acid rinse, an acid leach wet air pollution control system, and an alkali leach wash in its manufacturing process.

The Maximum daily production rate for the facility is:
4.7 million pounds per day of Tungstic Acid (as W)
3.5 million pounds per day of Sodium Tungstate (as W)

Question:
What is the technology-based effluent limit for lead at the facility?

Answer:
BPT calculation for lead (§ 421.102):

a) **Tungstic acid rinse:**
(4.7 million lbs/day) × (17.230 lbs/million lbs) = 80.981 lbs/day

b) **Acid leach wet air pollution control:**
(4.7 million lbs/day) × (15.040 lbs/million lbs) = 70.688 lbs/day

c) **Alkali leach wash:**
(3.5 million lbs/day) × (0.000 lbs/million lbs) = 0.000 lbs/day

d) **Total allowable discharge** = 80.981 + 70.688 + 0.000 = 151.669 = **152 lbs/day**

BAT calculation for lead (§ 421.103):

a) **Tungstic acid rinse:**
(4.7 million lbs/day) × (11.490 lbs/million lbs) = 54.003 lbs/day

b) **Acid leach wet air pollution control:**
(4.7 million lbs/day) × (1.003 lbs/million lbs) = 4.7141 lbs/day

c) **Alkali leach wash:**
(3.5 million lbs/day) × (0.000 lbs/million lbs) = 0.000 lbs/day

d) **Total allowable discharge** = 54.003 + 4.7141 + 0.000 = 58.7171 = **59 lbs/day***

The technology-based maximum daily limitation for lead at the facility is the BAT limitation of **59 lbs/day**. That value is compared with the water quality-based effluent limitation for lead, to ensure that all applicable standards are implemented through the final effluent limitations.

* calculated to 2 significant figures

The building block approach is applied in other circumstances as well, such as

- **Mixture of mass-based and concentration-based requirements:** The limitations in effluent guidelines for some pollutants are mass-based, production-normalized limitations in some subparts and concentration-based limitations in other subparts. When all the wastewater streams go to the same treatment system, the permit writer would need to convert the concentration-based limitations to mass-based limitations so they could be combined with the mass-based, production-normalized limitations and applied to the combined wastewater streams.
- **Mixture of different concentration-based requirements:** Some facilities could have multiple operations that are each subject to different concentration-based requirements for the same pollutant but with wastewater streams that combine before treatment. In such a case, the permit writer can establish a flow-weighted concentration-based limitation as the TBEL for the combined wastewater streams or convert the concentration-based requirements to equivalent mass-based requirements using flow data and then combine the mass-based requirements into a single limitation for the combined wastewater streams.

- **Mixture of regulated and unregulated wastewater streams:** In some cases, wastewater streams containing a pollutant regulated by the applicable effluent guidelines requirements can combine with other wastewater streams that do not have effluent guidelines requirements that regulate the pollutant. In such a case, the permit writer could use BPJ to establish a TBEL for the unregulated wastewater stream(s) (see section 5.2.3 below) and, as appropriate, calculate a final TBEL for the combined wastewater streams. For example, if one of the wastewater streams contributing to an industrial facility's discharge is sanitary wastewater, the permit writer might use BPJ to apply the treatment standards for domestic wastewater and calculate BOD_5 limitations for that wastewater stream. The secondary treatment standards, discussed in section 5.1 above, could be used to calculate mass-based limits for the sanitary wastewater using the concentration-based requirements and an estimate of flow rate that is expected to represent the flow rate during the proposed permit term. A final TBEL for BOD_5 could be calculated for the combined sanitary and process wastewater streams by combining the two mass limitations using the building block approach.
- **Mixture of wastewater streams containing a pollutant with wastewater streams not containing the pollutant:** If a wastewater stream that does not contain a pollutant is combined with another wastewater stream that contains the pollutant (and has applicable requirements in the effluent guidelines or requirements determined by the permit writer using BPJ), the permit writer must ensure that the non-regulated waste stream does not dilute the regulated waste stream to the point where the pollutant is not analytically detectable. If that occurs, the permit writer will most likely need to establish internal outfalls, as allowed under § 122.45(h) and in Step 7 below.

For examples of addressing combined wastewater streams, see section 15.3.3 on page 15-10 of EPA's *Technical Development Document for the Final Effluent Limitations Guidelines and Standards for the Meat and Poultry Products Point Source Category (40 CFR 432)*[8] <www.epa.gov/waterscience/guide/mpp/final/tdd15.pdf>.

Facilities with Both New and Existing Sources

Finally, as noted above, if effluent guidelines are applicable to an existing facility, and that facility adds a new production line, which becomes a *new source*, the permit writer should calculate TBELs for the subsequent permit using BPT, BCT, and BAT standards for the existing production line and NSPS for the new production line, as discussed in section 5.2.2.4 above.

5.2.2.7 Step 7: Apply Additional Regulatory Considerations in Calculating TBELs

The permit writer must consider several additional requirements when deriving TBELs from effluent guidelines. Those additional requirements consist of evaluating or accounting for the following:

- Expected significant increases or decreases in production during the permit term for tiered discharger limitations.
- Internal outfalls.
- Requests for a variance from effluent guidelines.

The following sections provide an overview of those topics.

Tiered Discharge Limitations

If production rates are expected to change significantly during the life of the permit, the permit writer can include tiered (alternate) TBELs as allowed by § 122.45(b)(2)(ii)(A)(i). Tiered TBELs would apply to mass-based effluent limitations and would become effective when production or flow (or some other measure of production) exceeded a threshold value, such as during seasonal production variations. Generally, up to a 20 percent fluctuation in production is considered to be within the range of normal variability, while changes in production higher than 20 percent could warrant consideration of tiered limitations. Exhibit 5-19 illustrates application of tiered limitations.

Exhibit 5-19 Example of tiered discharge limitations

Plant B produced approximately 40 tons per day of product during spring and summer months (i.e., March through August) and 280 tons per day during fall and winter months during the previous 5 years. Production during the fall and winter months is significantly higher than during the off-season, and the discharger has made a plausible argument that production is expected to continue at that level. The effluent guidelines requirements for Pollutant Z are 0.08 lbs/1,000 lbs for the average monthly limitation and 0.14 lbs/1,000 lbs for the maximum daily limitation.

Question:
What are appropriate tiered effluent limitations for Plant B?

Answer:
The first tier or lower limitations would be based on a production rate of 40 tons per day. The limitations would apply between March and August.

Monthly average limitation:
40 tons/day × 2,000 lbs/ton x 0.08 lbs/1,000 lbs = **6.4 lbs/day***

Daily maximum limitation:
40 tons/day × 2,000 lbs/ton x 0.14 lbs/1,000 lbs = 11.2 lbs/day = **11 lbs/day***

The second tier or higher limitations would be based on a production rate of 280 tons per day. Those limitations would apply between September and February.

Monthly average limitation:
280 tons/day × 2,000 lbs/ton x 0.08 lbs/1,000 lbs = 44.8 lbs/day = **45 lbs/day***

Daily maximum limitation
280 tons/day × 2,000 lbs/ton x 0.14 lbs/1,000 lbs = 78.4 lbs/day = **78 lbs/day***

* calculated to 2 significant figures

Permit writers should include tiered limitations in a permit only after careful consideration of production data and only when a substantial increase or decrease in production is likely to occur. In the example above, the lower limitations would be in effect when production was at low levels (March through August). During periods of significantly higher production (September through February), the higher limitations would be in effect. In addition, a tiered or alternate set of limitations might be appropriate in the case of special processes or product lines that operate during certain times only.

Permit writers could base thresholds for tiered limitations on an expected increase in production during the term of the permit that will continue through the duration of the permit term. For example, if a facility plans to add a process line and significantly expand production in year 3 of the permit term, the permit could specify a higher tier of limitations that go into effect when the facility reports reaching a production level specified in the permit.

Permit writers must detail in the permit the thresholds and time frames when each tier applies, measures of production, and special reporting requirements. Special reporting requirements include provisions such as the following:

- The facility notifying the permitting authority a specified number of business days before the month it expects to be operating at a higher level of production and the duration this level of production is expected to continue.
- The facility reporting, in the discharge monitoring report, the level of production and the limitation and standards applicable to that level.

A detailed discussion of the rationale and requirements for any tiered limitations should be provided in the fact sheet for the permit.

Internal Outfalls

The NPDES regulations at § 122.45(h) give NPDES permit writers the authority to identify internal outfalls when effluent limitations at the final outfall are impractical or infeasible. These internal compliance points might be necessary to ensure proper treatment of persistent, bioaccumulative, and toxic pollutants that are discharged in concentrations below analytic detection levels at the final effluent outfall or other pollutants that may be diluted by flows (e.g., cooling water) not containing the pollutant. Some effluent guidelines may *require* the use of internal outfalls unless the effluent limitations are adjusted based on the dilution ratio of the process wastewater to the wastewater flow at the compliance point. Examples of effluent guidelines with required internal compliance points include the Metal Finishing effluent guidelines (Part 433) and the Pulp, Paper, and Paperboard effluent guidelines (Part 430). Accordingly, the permit writer should identify any internal outfall monitoring that might be required by the applicable effluent guidelines and include monitoring requirements in the final permit.

Effluent Guidelines Variances

The CWA and federal regulations provide limited mechanisms for variances from requirements in effluent guidelines. An NPDES permit applicant must meet very specific data and variance application deadline requirements before a variance may be granted. A variance provides a unique exception to a particular requirement, and the permit writer should not expect to routinely receive variance requests. Nevertheless, the permit writer should be aware of the major types of variances and the basic requirements for each, because the permit writer will most likely be the person to conduct the initial reviews of such requests before submitting them for review to the State Director (if applicable) or to EPA.

Variance applications are submitted by the NPDES permit applicant and must be submitted before the close of the public comment period of the permit, except for Fundamentally Different Factors (FDF) variance requests, which must be requested by the NPDES permit applicant within 180 days of the effluent guidelines publication. The permit writer should consult § 124.62 for the specific procedures for decisions regarding various types of variances. Exhibit 5-20 lists the available variances from effluent guidelines.

Exhibit 5-20 Variances from effluent guidelines

Legislation (CWA section)	Type	Regulation (40 CFR)	Approval authority	Application deadline
301(g)	Nonconventional Pollutant	Part 125, Subpart F (Reserved)	EPA Region HQ delegated authority	During permit comment period
301(n)	Fundamentally Different Factors (FDF)	Part 125, Subpart D	EPA Region HQ delegated authority	180 days from the date the limitation or standard is published in the FR
—	Net Intake or Net/Gross	§ 122.45(g)	NPDES state or EPA Region in absence of approved state NPDES program	During permit comment period

The following paragraphs further discuss the variances listed in Exhibit 5-20 and the factors that are considered in a technical review of a variance request.

Nonconventional Pollutant—CWA Section 301(g) Variance

CWA section 301(g) and the regulations at § 122.21(m)(2) provide for a variance from new or revised BAT effluent guidelines for certain nonconventional pollutants because of local environmental factors, so long as the discharger demonstrates that it is meeting BPT and that the discharge does not prevent attainment of water quality standards and would not result in additional requirements on other point or nonpoint sources. The pollutants for which a facility may request a CWA section 301(g) variance are ammonia, chlorine, color, iron, and phenols (as measured by the colorimetric 4-aminoantipyrine [4AAP] method). The CWA also provides a process to petition to include additional pollutants on this list. Industries with facilities that have applied for CWA section 301(g) variances include Iron and Steel Manufacturing (Part 420), Steam Electric Power Generating (Part 423), Inorganic Chemicals Manufacturing (Part 415), Nonferrous Metals Manufacturing (Part 421), Aluminum Forming (Part 467), and Pesticides Chemicals (Part 455) facilities.

In addition to meeting the application deadline, the discharger must file a variance application that meets the following requirements:

- The proposed modified requirements must result in compliance with BPT and water quality standards of the receiving stream.
- No additional treatment will be required of other point or nonpoint source dischargers as a result of the variance approval.
- The modified requirements will not interfere with attainment or maintenance of water quality to protect public water supplies, or with protection and propagation of a balanced population of shellfish, fish, and wildfowl, and will allow recreational activities in and on the water.
- The modified requirements will not result in quantities of pollutants that can reasonably be anticipated to pose an unacceptable risk to human health or the environment, cause acute or chronic toxicity, or promote synergistic properties.

The permit writer should review the request to ensure that it complies with each of the requirements for this type of variance. This variance request can involve a great deal of water quality assessment, including aquatic toxicity, mixing zone and dilution model analysis, and possible site-specific criterion development. In addition, it might be necessary to assess many complex human health effects, including carcinogenicity, teratogenicity, mutagenicity, bioaccumulation, and synergistic propensities. Permit writers may use EPA's *Draft Technical Guidance Manual for the Regulations Promulgated Pursuant to Section 301(g) of the Clean Water Act of 1977 40 CFR Part 125 (Subpart F)* <www.epa.gov/npdes/pubs/owm0008.pdf> to assess a completed variance request.

Fundamentally Different Factors—FDF Variance

Alternative effluent limitations or standards different from the otherwise applicable requirements in effluent guidelines may be authorized by EPA if an individual facility is fundamentally different with respect to factors considered in establishing the limitations or standards otherwise applicable to that facility's industrial category. Such a modification is known as a *fundamentally different factors* (FDF) variance.

Facilities must submit all FDF variance applications to the appropriate Director, as defined at § 122.2, no later than 180 days from the date the limitations or standards are published in the FR [see CWA section 301(n)(2) and § 122.21(m)(1)(i)(B)(2)]. An FDF variance is not available to a new source subject to NSPS.

EPA regulations at Part 125, Subpart D, authorizing the EPA Regional Administrators to establish alternative limitations and standards, further detail the substantive criteria used to evaluate FDF variance requests for direct dischargers. The regulations at § 125.31(d) identify six factors that may be considered in determining if a facility is fundamentally different:

- Nature or quality of pollutants contained in the raw process wastewater.
- Volume of the process wastewater and effluent discharged.
- Non-water quality environmental impact of control and treatment of the raw wasteload.
- Energy requirements of the application of control and treatment technology.
- Age, size, land availability, and configurations of discharger's equipment or facilities as well as processes employed, process changes, and engineering aspects of the application of control technology.
- Cost of compliance with required control technology.

The Agency must determine whether, on the basis of one or more of those six factors, the facility in question is fundamentally different from the facilities and factors considered by EPA in developing the nationally applicable effluent guidelines. The regulation also lists four other factors that may not provide a basis for an FDF variance:

- Infeasibility of installation within the time allowed by the CWA.
- Assertion that the national limitations cannot be achieved with the appropriate waste treatment facilities installed (if the assertion is not based on one or more of the six FDF factors above).
- A discharger's ability to pay for the required water treatment.

- The impact of a discharge on local receiving water quality.

In addition, under § 125.31(b)(3), a request for limitations less stringent than the national limitation may be approved only if compliance with the national limitations would result in either of the following:

- Removal cost wholly out of proportion to the removal cost considered during development of the national limitations.
- Non-water quality environmental impact (including energy requirements) fundamentally more adverse than the impact considered during development of the national limitations.

The conditions for approval of a request to modify applicable pretreatment standards and factors considered are the same as those for direct dischargers.

The legislative history of CWA section 301(n) underscores the necessity for the FDF variance applicant to establish eligibility for the variance. EPA's regulations at § 125.32(b)(1) are explicit in imposing that burden on the applicant. The applicant must show that the factors relating to the discharge controlled by the applicant's permit, which are claimed to be fundamentally different are, in fact, fundamentally different from those factors considered by the EPA in establishing the applicable effluent guidelines. The pretreatment regulations incorporate a similar requirement at § 403.13(h)(9).

Intake Allowance or Net/Gross Variance

Some facilities might be unable to comply with effluent guidelines because of pollutants in their intake water. Under certain circumstances, the NPDES regulations allow credit for pollutants in intake water. Specifically, permit writers are authorized to grant net credits for the quantity of pollutants in the intake water where (1) the applicable effluent guidelines specify that the guidelines are to be applied on a net basis; or (2) the pollution control technology would, if properly installed and operated, meet applicable effluent guidelines without the pollutants in the intake waters. The following requirements are included in § 122.45(g) for establishing net limitations:

- Credit for conventional pollutants, such as BOD_5 or TSS, are only authorized where the constituents resulting in the effluent BOD_5 and the TSS are similar between the intake water and the discharge.
- Credit is authorized only up to the extent necessary to meet the applicable limitation or standard, with a maximum value equal to the influent concentration.
- Intake water must be taken from the same body of water into which the discharge is made.
- Net credits do not apply to the discharge of raw water clarifier sludge generated during the treatment of intake water.

Permit writers must include influent monitoring in the permit when this type of variance is granted.

Thermal Discharge—CWA Section 316(a) Variance

CWA section 316(a) and the regulations at § 122.21(m)(6) provide for variances from thermal effluent limitations in NPDES permits. EPA has only promulgated thermal limitations in effluent guidelines for two industrial sectors: Beet Sugar Processing Subcategory of the Sugar Processing Point Source Category (Part 409 Subpart A) and the Cement Manufacturing Point Source Category (Part 411, Subparts A and B).

Most thermal limitations are based on water quality standards, so most thermal variances actually are not true *technology-based* variances. Dischargers must apply for a thermal discharge variance with its permit application if the thermal effluent limitation is based on an effluent guideline or during the permit comment period if the thermal effluent limitation is based on a WQBEL.

Regulations for submitting and reviewing thermal discharge variance requests are promulgated at Part 125, Subpart H. The approval authority for a thermal discharge variance request is the state permitting authority or the EPA Region if there is no approved state NPDES program. Less stringent alternative thermal effluent limitations may be included in permits if the discharger properly demonstrates that such effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made, taking into account the cumulative impact of its thermal discharge together with all other significant impacts on the species affected. Once a variance is granted, the discharger must still reapply for the variance each permit term. The majority of thermal variance requests are from power plants seeking relief from water-quality based effluent limitations.

Climate Change Considerations

Evaluation of requests for variances under CWA section 316(a) requires consideration of the change to the ambient water temperature because of an effluent discharge. The studies provided by applicants to support their requests frequently include historical thermal data for the receiving water. Permitting authorities should be aware that the effects of global climate change could alter the thermal profile of some receiving waters making the historical record of thermal conditions less representative of future conditions. Where appropriate, water quality models should take these potential changes into account.

5.2.2.8 Step 8: Apply Additional Requirements in Effluent Guidelines

The effluent guidelines could provide additional requirements for permit writers to consider when applying them in NPDES permits.

Industrial Stormwater

Industrial stormwater is sometimes regulated by effluent guidelines. In particular, effluent guidelines often regulate stormwater for industrial activities that are unsheltered (e.g., mining, outdoor processing, outside storage of product materials). Examples of contaminated stormwater regulated by effluent guidelines include the Concentrated Animal Feeding Operations (Part 412), Fertilizer Manufacturing (Part 418), Petroleum Refining (Part 419), Iron and Steel Manufacturing (Part 420), Pulp, Paper, And Paperboard (Part 430), Metal Products and Machinery (Part 438), and Ore Mining and Dressing (Part 440) point source categories. The permit writer should identify any specific stormwater controls that may be required by the applicable effluent guidelines accordingly.

Stormwater not regulated by effluent guidelines that is commingled with process wastewater will require the adjustment of the effluent limitations as discussed in Step 6 above. Section 9.3.1 of this manual provides additional information about stormwater discharges associated with industrial activities.

Identify the Analytical Methods for Measuring Compliance with TBELs

The permit writer should ensure that the permit specifies the use of the correct analytical methods for demonstrating compliance with TBELs derived from effluent guidelines. The effluent guidelines often require specific analytical methods. For example, the *General Definitions* section of the Meat and Poultry Products effluent guidelines [§ 432.2(l)] states, "The approved methods of analysis for the following six parameters [Ammonia (as N), BOD_5, Oil and Grease (O&G), O&G as hexane extractable material (HEM), Total Nitrogen, TSS] are found in Table 1B in 40 CFR 136.3. The nitrate/nitrite part of total nitrogen may also be measured by EPA Method 300.0 (incorporated by reference, see § 432.5)." Section 8.3 of this manual provides additional information on analytical methods in the NPDES permitting process.

Documentation and Recordkeeping Requirements

Specific documentation and recordkeeping requirements (e.g., solvent management plans, BMP plans, alternative monitoring requirements) may be included in the applicable effluent guidelines. The permit writer should ensure that the documentation and recordkeeping requirements are included in the NPDES permit. For example, to use the alternative monitoring compliance method for controlling toxic organics in the Metal Finishing effluent guidelines, the NPDES permit applicant must not only make a certification statement (see Exhibit 5-15), but must also "submit a solvent management plan that specifies to the satisfaction of the permitting authority (or, in the case of indirect dischargers, the control authority) the toxic organic compounds used; the method of disposal used instead of dumping, such as reclamation, contract hauling, or incineration; and procedures for ensuring that toxic organics do not routinely spill or leak into the wastewater" as required by § 433.12(b). Other examples of such documentation and recordkeeping requirements include the BMP Plans used in the Oil and Gas Extraction (Part 435) and the Concentrated Aquatic Animal Production effluent guidelines (Part 451), the pollution prevention alternative in the Pesticide Chemicals effluent guidelines (Part 455), and alternative monitoring requirements (e.g., certification in lieu of monitoring for chloroform, in the Pulp, Paper, and Paperboard effluent guidelines (Part 430).

5.2.2.9 Step 9: Document the Application of Effluent Guidelines in the Fact Sheet

Permit writers need to document their application of effluent guidelines in the NPDES permit fact sheet. The permit writer should clearly identify the data and information used to determine the applicable effluent guidelines and how that information was used to derive effluent limitations for the permit. The information in the fact sheet should provide the NPDES permit applicant and the public a transparent, reproducible, and defensible description of how the NPDES permit properly incorporates effluent guidelines.

Similarly, permit writer should also document the rationale for concluding that there are no applicable effluent guidelines for a discharge or pollutant. In such cases, TBELs may be determined by the permit writer on a case-by-case basis as discussed in section 5.2.3 below.

5.2.3 Case-by-Case TBELs for Industrial Dischargers

As previously stated, § 125.3(a) indicates that technology-based treatment requirements under section 301(b) of the CWA represent the minimum level of control that must be imposed in an NPDES permit.

Where EPA-promulgated effluent guidelines are not applicable to a non-POTW discharge, such requirements are established on a case-by-case basis using BPJ.

5.2.3.1 Legal Authority to Establish Case-by-Case TBELs

Case-by-case TBELs are developed pursuant to CWA section 402(a)(1), which authorizes the EPA Administrator to issue a permit that will meet either, all applicable requirements developed under the authority of other sections of the CWA (e.g., technology-based treatment standards, water quality standards, ocean discharge criteria) or, before taking the necessary implementing actions related to those requirements, "such conditions as the Administrator determines are necessary to carry out the provisions of this Act." The regulation at § 125.3(c)(2) specifically cites this section of the CWA, stating that technology-based treatment requirements may be imposed in a permit "on a case-by-case basis under section 402(a)(1) of the Act, to the extent that EPA-promulgated effluent limitations are inapplicable." Further, § 125.3(c)(3) indicates that "where promulgated effluent limitations guidelines only apply to certain aspects of the discharger's operation, or to certain pollutants, other aspects or activities are subject to regulation on a case-by-case basis to carry out the provisions of the [a]ct." When establishing case-by-case effluent limitations using BPJ, the permit writer should cite in the fact sheet or statement of basis both the approach used to develop the limitations, which is discussed further below, and how the limitations carry out the intent and requirements of the CWA and the NPDES regulations.

5.2.3.2 Identifying the Need for Case-by-Case TBELs

As noted above, case-by-case TBELs are established in situations where EPA promulgated effluent guidelines are inapplicable. That includes situations such as the following:

- When EPA has not yet promulgated effluent guidelines for the point source category to which a facility belongs (e.g., a facility that produced distilled and blended liquors [SIC code 2085] and is part of the miscellaneous foods and beverages category, which does not now have any applicable effluent guidelines).
- When effluent guidelines are available for the industry category, but no effluent guidelines are available for the facility subcategory (e.g., discharges from coalbed methane wells are not now regulated by effluent guidelines; however, EPA considers the coalbed methane industrial sector as a potential new subcategory of the existing Oil and Gas Extraction point source category [Part 435] because of the similar industrial operations performed [i.e., drilling for natural gas extraction]).
- When effluent guidelines are available for the industry category but are not applicable to the NPDES permit applicant (e.g., facilities that do not perform the industrial operation triggering applicability of the effluent guidelines or do not meet the production or wastewater flow cutoff applicability thresholds of the effluent guidelines). For example, assume that the poultry slaughterhouse in Example 2 of Exhibit 5-13 above produces 50 million pounds of whole, halved, quarter or smaller meat cuts annually. In that case, any TBELs for the facility would be case-by-case limitations developed using BPJ because the facility is below the annual production threshold of 100 million pounds listed in the effluent guideline (Part 432, Subpart K).
- When effluent guidelines are available for the industry category, but no effluent guidelines requirements are available for the pollutant of concern (e.g., a facility is regulated by the effluent guidelines for Pesticide Chemicals [Part 455] but discharges a pesticide that is not regulated by

these effluent guidelines). The permit writer should make sure that the pollutant of concern is not already controlled by the effluent guidelines and was not considered by EPA when the Agency developed the effluent guidelines.

Generally, case-by-case limitations are appropriate when at least one of the conditions listed above applies and the pollutant is present, or expected to be present, in the discharge in amounts that can be treated or otherwise removed (e.g., implementation of pollution prevention measures). The resources listed in sections 5.2.2.2 above and 5.2.3.4 below will help the permit writer in making such determinations. For example, EPA's effluent guidelines planning support documents on EPA's Effluent Guidelines Biennial Plan Website <www.epa.gov/guide/304m/> identify facilities and industrial sectors that currently are not regulated by effluent guidelines.

5.2.3.3 Factors Considered When Developing Case-by-Case TBELs

The NPDES regulations at § 125.3(c)(2) require that permit writers developing case-by-case effluent limitations consider the following:

- The appropriate technology for the category class of point sources of which the applicant is a member, based on all available information.
- Any unique factors relating to the applicant.

The regulations also require that, in setting case-by-case limitations, the permit writer consider several specific factors established in § 125.3(d) to select a model treatment technology and derive effluent limitations on the basis of that treatment technology. That process and the factors considered by the permit writer are the same factors required to be considered by EPA in developing effluent guidelines and, therefore, are often referred to as the CWA section 304(b) factors. The factors are summarized below in Exhibit 5-21. The permit writer evaluates case-by-case limitations based on BPT, BCT, and BAT and uses the more stringent technology level of control for each pollutant of concern.

Exhibit 5-21 Summary of factors considered when developing case-by-case TBELs

For BPT requirements (all pollutants)
- The age of equipment and facilities involved*
- The process(es) employed*
- The engineering aspects of the application of various types of control techniques*
- Process changes*
- Non-water quality environmental impact including energy requirements*
- The total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application

For BCT requirements (conventional pollutants)
- All items in the BPT requirements indicated by an asterisk (*) above
- The reasonableness of the relationship between the costs of attaining a reduction in effluent and the derived effluent reduction benefits
- The comparison of the cost and level of reduction of such pollutants from the discharge of POTWs to the cost and level of reduction of such pollutants from a class or category of industrial sources

For BAT requirements (toxic and non-conventional pollutants)
- All items in the BPT requirements indicated by an asterisk (*) above
- The cost of achieving such effluent reduction

The CWA also gives the permit writer the authority to consider process changes to evaluate case-by-case limitations. As previously stated, technology-based controls in NPDES permits are performance-based measures. EPA incorporates technology-based controls in NPDES permits that correspond to the application of an identified technology (including process changes) but does not require dischargers to install the identified technology. Therefore, EPA leaves to each facility the discretion to select the technology design or process changes necessary to meet the TBELs specified in the NPDES permit.

The permit writer might need to establish a monitoring-only requirement in the current NPDES permit to identify pollutants of concern and potential case-by-case limitations for the subsequent NPDES permit renewal.

5.2.3.4 Resources for Developing Case-by-Case TBELs

There are numerous resources for identifying candidates for model technologies or process changes and developing case-by-case TBELs using BPJ. Exhibit 5-22 lists some example references that permit writers can use to derive such limitations.

5.2.3.5 Statistical Considerations When Establishing Case-by-Case TBELs

The quality of the effluent from a treatment facility will normally vary over time. If, for example, BOD_5 data for a typical treatment plant were plotted against time, one would observe day-to-day variations of effluent concentrations. Some of that behavior can be described by constructing a frequency-concentration plot. From the plot, one could observe that for most of the time, BOD_5 concentrations are near some average value. Any treatment system can be described using the mean concentration of the parameter of interest (i.e., the long-term average) and the variance (or coefficient of variation) and by assuming a particular statistical distribution (usually lognormal).

When developing a case-by-case limitation, permit writers can use an approach consistent with the statistical approach EPA has used to develop effluent guidelines. Specifically, the maximum daily limitation could be calculated by multiplying the long-term average achievable by implementation of the model technology or process change by a daily variability factor determined from the statistical properties of a lognormal distribution. The average monthly limitation can be calculated similarly except that the variability factor corresponds to the distribution of monthly averages instead of daily concentration measurements. The daily variability factor is a statistical factor defined as the ratio of the estimated 99th percentile of a distribution of daily values divided by the mean of the distribution. Similarly, the monthly variability factor is typically defined as the estimated 95th percentile of the distribution of monthly averages divided by the mean of the distribution of monthly averages.

A modified delta-lognormal distribution could be fit to concentration data and variability factors computed for the facility distribution. The modified delta-lognormal distribution models the data as a mixture of measured values and observations recorded as values less than the detectable level. This distribution often is selected because the data for many analytes consists of such a mixture of measured values and results below the detectable level. The modified delta-lognormal distribution assumes that all non-detected results have a value equal to the detection limitations and that the detected values follow a lognormal distribution.

Exhibit 5-22 Tools for developing case-by-case TBELs using BPJ

Permit file information
- Current and previous NPDES application forms.
- Previous NPDES permit and fact sheet.
- Discharge monitoring reports.
- Compliance inspection reports.

Information from existing facilities and permits
- NPDES Individual and General Permits for other NPDES permits issued to facilities in the same region or state, or that include case-by-case limitations for the same pollutants.
- Toxicity reduction evaluations for selected industries.
- Other media permit files (e.g., Resource Conservation and Recovery Act [RCRA] permit applications and Spill Prevention Countermeasure and Control [SPCC] plans.
- ICIS-NPDES <https://icis.epa.gov/icis> data.
- Literature (e.g., technical journals and books).

Effluent guidelines development and planning information
- Industry experts within EPA headquarters, EPA Regions, and states <www.epa.gov/guide/contacts.html>.
- Development Documents, CWA section 308 questionnaires, screening and verification data, proposed and final regulations, contractor's reports, and project officer contacts <www.epa.gov/guide>.
- EPA's Technical Support Documents <www.epa.gov/guide/304m> and records supporting EPA's biennial effluent guidelines program plans also provide additional useful information. In particular, such resources provide a sample of the current limitation and latest developments in industrial pollutant prevention, water conservation, and wastewater treatment. The Technical Support Documents also identify industrial sectors not currently regulated by effluent guidelines.

Statistical guidance
- Effluent Guidelines Technical Development Support Documents, such as the Development Document for Final Effluent Limitations Guidelines and Standards for the Iron and Steel Manufacturing Point Source Category <www.epa.gov/guide/>.

Economics guidance
- *Protocol and Workbook for Determining Economic Achievability for NPDES Permits*[9] <www.epa.gov/npdes/pubs/protocol_npdespermits.pdf> and <www.epa.gov/npdes/pubs/workbook_econ_permits.pdf>.
- *BCT Cost Test Guidance* <www.epa.gov/npdes/pubs/owm0009.pdf>.

Guidance for BMP-based limitations
- *Guidance Manual for Developing Best Management Practices (BMPs)*[10] <www.epa.gov/npdes/pubs/owm0274.pdf>.
- *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and BMPs*[11]<www.epa.gov/npdes/pubs/contents_indguide.pdf>.
- National Menu of Stormwater Best Management Practices <www.epa.gov/npdes/stormwater/menuofbmps>.

For more details on EPA's use of statistical methods for developing effluent guidelines, refer to Development Document for Final Effluent Limitations Guidelines and Standards for the Iron and Steel Manufacturing Point Source Category <www.epa.gov/guide/ironsteel/reg/tdd.htm>.

5.2.3.6 Documenting Case-by-Case TBELs in the Permit Fact Sheet

Permit writers will need to document the development of case-by-case limitations in the NPDES permit fact sheet. The permit writer should clearly identify the data and information used in developing these effluent limitations and how that information was used. The permit writer also should document the rationale for concluding that there are no applicable effluent guidelines for the industrial wastewater or pollutant discharge. The information in the fact sheet should provide the NPDES permit applicant and the public a transparent, reproducible, and defensible description of how the BPJ limitations comply with the CWA and EPA regulations.

[1] U.S. Environmental Protection Agency. 1985. *Draft Guidance for NPDES Permits and Compliance Personnel—Secondary Treatment Redefinition.* U.S. Environmental Protection Agency. Office of Water Enforcement and Permits. Washington, DC.

[2] U.S. Environmental Protection Agency. 1994. *Amended Section 301(h) Technical Support Document*. EPA-842-B-94-007. U.S. Environmental Protection Agency. Office of Wetlands Oceans and Watersheds, Washington, DC.

[3] U.S. Environmental Protection Agency. 1977. *Interim Final Supplement for Pretreatment to the Development Document for the Petroleum Refining Industry Existing Point Source Category*, EPA-440-1-76-083A. Page 92. U.S. Environmental Protection Agency, Office of Water and Hazardous Materials, Washington, DC. Publication available on NEPIS Website <www.epa.gov/nscep/> as document 440176083A.

[4] Boornazian, Linda and Mary Smith. 2006. *New Source Dates for Direct and Indirect Dischargers*. U.S. Environmental Protection Agency, Office of Water Memorandum. September 28, 2006. <www.epa.gov/npdes/pubs/newsource_dates.pdf>.

[5] U.S. Environmental Protection Agency. 1987. *Development Document for Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics and Synthetic Fibers Point Source Category*. EPA 440-1-87-009. Page IX-9. <www.epa.gov/waterscience/guide/ocpsf/#guidance>.

[6] Jordan, J.W. 1984. *Calculations of Production-Based Effluent Limits*. U.S. Environmental Protection Agency, Office of Water, Washington, DC. Memorandum, December 18, 1984. <www.epa.gov/npdes/pubs/owm0427.pdf>.

[7] U.S. Environmental Protection Agency. 2001. *Permit Guidance Document: Transportation Equipment Cleaning Point Source Category (40 CFR 442)*, p. 30. EPA-821-R-01-021. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/waterscience/guide/teci/tecguid.pdf>.

[8] U.S. Environmental Protection Agency. 2004. *Technical Development Document for the Final Effluent Limitations Guidelines and Standards for the Meat and Poultry Products Point Source Category (40 CFR 432),* EPA-821-R-04-011. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/waterscience/guide/mpp/final/tdd15.pdf>.

[9] Putnam, Hayes and Bartlett, Inc. 1982. *Protocol and Workbook for Determining Economic Achievability for National Pollutant Discharge Elimination System Permits*. U.S. Environmental Protection Agency, Permits Division, Washington, DC. <www.epa.gov/npdes/pubs/protocol_npdespermits.pdf.> and <www.epa.gov/npdes/pubs/workbook_econ_permits.pdf>

[10] U.S. Environmental Protection Agency. 1993. *Guidance Manual for Developing Best Management Practices (BMP)*. EPA 833-B-93-004. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/owm0274.pdf>.

[11] U.S. Environmental Protection Agency. 1992. *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and BMPs*. EPA 832-R-92-006. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/contents_indguide.pdf>.