Idaho Pollutant Discharge Elimination System

Effluent Limit Development Guidance

State of Idaho
Department of Environmental Quality

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Table of Contents

List of Tables

List of Figures

List of Equations

Abbreviations and Acronyms

§	section (usually a section of federal or state rules or statutes)
BAT	best available technology economically achievable
BCT	best conventional pollutant control technology
BMP	best management practice
BOD_5	five-day biochemical oxygen demand
BPJ	best professional judgment
BPT	best practicable control technology currently available
$cBOD_5$	carbonaceous five-day biochemical oxygen demand
CCC	Criterion continuous concentration
CFR	code of federal regulations (refers to citations in the federal administrative rules)
CMC	Criterion maximum concentration
CV	coefficient of variation
CWA	Clean Water Act
DEQ	Idaho Department of Environmental Quality
DMR	discharge monitoring report
EDU	equivalent dwelling unit
ELDG	IPDES Effluent Limit Development Guidance
ELG	effluent limit guideline
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FDF	fundamentally different factors
HEM	hexane extractable materials
IBR	incorporated by reference (into IDAPA 58.01.25)
IDAPA	refers to citations of Idaho administrative rules
I/I	infiltration and inflow
IP	individual permit
IPDES	Idaho Pollutant Discharge Elimination System
IU	industrial user
kg	kilogram
L	liter
LTA	long-term average
MCL	maximum contaminant level
MDL	method detection limit
mg/L	milligrams per liter
mgd	million gallons per day
ML	minimum level of quantitation
NAICS	North American industry classification system
NPDES	National Pollutant Discharge Elimination System
NSPS	new source performance standard

O&M	operations and maintenance
ORW	outstanding resource waters
PCB	polychlorinated biphenyl
POTW	publicly owned treatment works
PSES	pretreatment standards for existing sources
PSNS	Pretreatment Standards for New Sources
QAPP	quality assurance project plans
QA/QC	quality assurance/quality control
RPA	reasonable potential analysis
RPTE	reasonable potential to exceed
SEP	supplemental environmental project
SHPO	state historic preservation offices
SIC	standard industrial classification
SPCC	spill prevention, control and countermeasure
SS	suspended solids
SSO	sanitary sewer overflow
SWMP	storm water management program
SWPPP	storm water pollution prevention plan
TBEL	technology-based effluent limit
TMDL	total maximum daily load
TOC	total organic carbon
TRC	technical review criteria
TSS	total suspended solids
TWTDS	treatment works treating domestic sewage
UAA	Use attainability analysis
US	United States
USGS	U.S. Geological Survey
USACE	United States Army Corps of Engineers
WER	water effects ration
WET	whole effluent toxicity
WLA	wasteload allocation
WQBEL	water quality-based effluent limit
WQS	Water quality standards

1 Introduction

The Idaho Department of Environmental Quality's (DEQ's) Idaho Pollutant Discharge Elimination System (IPDES) Program developed this Effluent Limit Development Guidance (ELDG) to help DEQ personnel, the regulated community, and public users understand the process for developing effluent limits in IPDES permits, including how DEQ evaluates the reasonable potential to exceed (RPTE) water quality standards. IPDES permits implement both technology-based and water quality-based controls, and contain effluent limits for point source dischargers consistent with the statutory and regulatory requirements of the IPDES Program, which governs the discharge of pollutants to waters of the United States in Idaho.

Effluent limits can have significant impacts to communities, businesses, the economy, and the environment of the State of Idaho. Given the implications, DEQ strives to ~~find the right balance between~~ appropriately navigate these interests, while adhering to requirements of the CWA, and associated state and federal rules, regulations, and implementation policies.

While ~~N~~no circumstances are identical and every permit is unique, ~~.~~ ~~T~~the ELDG provides logical pathways for developing effluent limits ~~and understanding~~ that appropriately address the issues, not a rigid framework that defaults to generic limitations. DEQ recognizes it is critically important to document the permit process from the beginning of monitoring, data management, mathematical computations, and interpretation of data all the way through to conclusions and effluent limits. DEQ also recognizes that ~~taking the time to get things right in the permit~~ an efficient and transparent process that provides access to permit writers with local knowledge and experience will lead to streamlined, ~~better~~ more effective, and fewer contested permits, ~~which will~~ ultimately benefitting water quality and the citizens of Idaho.

1.1 Purpose and Need

The purpose of this guide is to provide Idaho-specific direction for the development of effluent limits in IPDES permits by defining the requirements for permits and addressing the challenges and perspectives unique to Idaho. For example, most of Idaho's communities are small, with limited technical resources and limited funds. Because permit monitoring and implementation are challenging and expensive for permittees, permit conditions and monitoring requirements must be clear, accurate, and appropriate to be beneficial. And it is critical that a high level of skill is used in the data analyses and interpretation. ~~DEQ will use common sense in developing permits that align with data needs, statutory requirements, and water quality objectives.~~

The ELDG provides direction for DEQ to recognize unique circumstances and find pathways to logical solutions that avoid previously-identified pitfalls and traps. This ~~guide~~ will occur by helping permit writers use reasonable assumptions in developing permits that connect the water quality issues with, effluent limits, monitoring requirements, and compliance frequencies that make sense, while aligning with data needs, statutory requirements, and water quality objectives.

This guide serves as a reference for IPDES permit writers to develop, and permittees to understand the development of permits and effluent limits by explaining:

- Framework and process for developing effluent limits
- Statutory/regulatory requirements and existing guidance

- Technical and statistical tools and constraints

~~The ELDG provides insight for DEQ to recognize unique circumstance and find pathways to logical solutions that avoid previously-identified pitfalls and traps.~~ While this guide provides direction in many cases, however, DEQ may have to ~~adjust~~ develop specific effluent limits in a permit to address site-specific concerns and conditions.

1.2 Effluent Limit Development Process

The ELDG follows the process of developing effluent limits in IPDES permits (Figure 1). Because of the process complexity it is impossible to completely identify each function chronologically. However, the ELDG does identify the procedural steps that IPDES permit writers will follow in drafting effluent limits, beginning with the initial information gathering and data assessment, through ~~evaluation of appropriate~~ establishing technology-based effluent limits (TBELs), evaluating RPTE and establishing water-quality based effluent limits (WQBELs), ~~calculations, all the way through~~ the antidegradation review, antibacksliding analyses and ~~application of~~ developing final effluent limits.

Figure 1. The effluent limit development process for IPDES permits.

1.3 Relationship to Existing Rules and Guidance

This guide is not intended to be a stand-alone document; rather, it supports implementation of the Clean Water Act (CWA), Idaho Code and administrative rules, federal regulations, and state and national policies, guidance, and standards. These include compliance with Idaho's "Water Quality Standards" (IDAPA 58.01.02), "Wastewater Rules" (IDAPA 58.01.16), and "Rules Regulating the IPDES Program" (IDAPA 58.01.25).

Some sections of this guide are newly developed to address rules, regulations, and conditions specific to Idaho, while other sections reference or represent an adaptation of numerous existing state and US Environmental Protection Agency (EPA) guidance documents, including but not limited to:

- *NPDES Permit Writer's Manual* (EPA 2010): *https://www3.epa.gov/npdes/pubs/pwm_2010.pdf*
- *NPDES Decision Analysis Report #2 – Appendix 4. Guidance for Water Quality-Based Effluent Limits* (DEQ 2002): *www.deq.idaho.gov/media/529907-npdes_primacy_report2.pdf*
- *Technical Support Document for Water Quality-based Toxics Control* (EPA 1991): *https://www3.epa.gov/npdes/pubs/owm0264.pdf*
- *The EPA NPDES website: https://www.epa.gov/npdes*

This guide does not replace, supplant, or change any requirements under state or federal rules and regulations but does identify and reference relevant regulations, policies, and other guidance documents.

1.3.1 Clean Water Act Background

The Federal Water Pollution Control Act, or CWA, is the primary US law addressing pollutants in receiving waters (e.g., streams, rivers, lakes, and reservoirs). The CWA was originally enacted in 1948 and was revised by significant amendments in 1972 (P.L. 92-500), and to a lesser degree in 1977 (P.L. 95-217) and in 1981 (P.L. 97-117). The most recent major amendments to the CWA were made in 1987 (P.L. 100-4). A major part of the CWA is a requirement for controls on discharges to meet the statutory goal of eliminating the discharge of pollutants under the National Pollutant Discharge Elimination System (NPDES) permit program.

1.3.2 Idaho Water Quality Standards

A water quality standard defines the water quality goals for a water body. ~~Water quality-based effluent limits (~~WQBELs~~)~~ in IPDES permits are a mechanism to achieve and maintain water quality standards in specific receiving waters. The federal water quality standards at 40 CFR 131 describe state requirements and procedures for developing water quality standards and EPA procedures for reviewing and, where appropriate, promulgating water quality standards. Idaho's water quality standards were developed in accordance with these federal requirements.

1.4 Regulatory Citations

The following conventions are used to cite legislation and regulations throughout this guide:

- Idaho Code—Title of the code follow by the code citation: "Approval of State NPDES Program" (Idaho Code §39-175C). After initial use, the code is then referred to by the citation (e.g., Idaho Code §39-175C).
- Idaho Administrative Rules—Title of the rule is followed by the rule citation: "Rules Regulating the Idaho Pollutant Discharge Elimination System Program" (IDAPA 58.01.25). After initial use, the rule is then referred to by the rule citation (e.g., IDAPA 58.01.25).
- Code of Federal Regulations—Initial and subsequent references to CFRs use the regulation citation (e.g., 40 CFR 136).
- US Code—Initial and subsequent references to US code use the code citation (e.g., 16 U.S.C. §1531 et seq. or 33 U.S.C. §§1251–1387).
- Clean Water Act (CWA)—Title of the act is followed by the act citation: Clean Water Act section 402 (e.g., CWA §402). After initial use, the act is then referred to by the act citation (e.g., CWA §402).

Guidance and other documents are referenced in full citation when used for the first time.

2 Data Analysis and Considerations

2.1 Background

The inherent variability of environmental data makes it important to obtain a sufficient quantity and quality of samples to accurately characterize a water body or effluent. Limited data result in greater statistical uncertainty and increases variability. When data quantity and quality increase, the methods used to determine RPTE water quality standards and to set WQBELs are more robust. Therefore, permittees often benefit from having a sufficient quantity and quality of data available for regulatory decision making.

DEQ, EPA, and permittees collect data on effluent and in-stream ambient waters for use in a variety of applications, including:

- Determining if water bodies are achieving water quality standards;
- Estimating effluent concentrations and variability for permit development and compliance; and
- Estimating background concentrations for total maximum daily load (TMDL) wasteload allocations (WLAs).

2.1.1 Data Quality

To ensure that data collected for regulatory decision-making are valid and not affected by contamination from sampling or analytical techniques, quality control must be incorporated in all sampling event planning, collection, preparation, and analysis activities.

All data used for monitoring and reporting related to an IPDES permit are required to meet specific quality assurance requirements, and be collected under a documented Quality Assurance Project Plan (QAPP). EPA's *Guidance for Quality Assurance Project Plans* (QA/G-5; EPA 2002) and *Requirements for Quality Assurance Project Plans* (QA/R-5; EPA 2001) apply~~ies~~ to all external data sources (e.g., federal databases, published data) and existing data collected by contractors or external organizations, unless specifically excluded by state or federal rules.

These third party data, also referred to as "secondary data" or "nondirect measurements," require DEQ to develop a programmatic QAPP to identify data quality needs and criteria that will be used to assess the quality of that data. A DEQ-generated programmatic IPDES QAPP will specify the methods used to perform data verification, validation, and assessment, including any relevant statistical methods, required QC elements, and contractor certifications that must be satisfied to accept data from external sources (DEQ 2012).

~~**However, data generated under requirements of IPDES permits that do not meet programmatic IPDES QAPP requirements may still be used in compliance actions.**~~

2.1.2 Data Applicability and Grouping

Similar to data quality, permit writers will evaluate whether the data are antiquated, stale, or represent the appropriate environmental conditions suitable for use in permitting. For example, some permits have been administratively extended for such a period of time that permit re-application data no longer reflect current conditions. Situations may also arise when ~~a TMDL or other~~ reference information becomes outdated and needs to be refreshed before being relied upon for permitting. Alternatively, permit writers will need to evaluate whether data should be divided into flow periods, seasons, or other groupings because of the specific location and circumstances of the facility.

In these situations, IPDES permit writers will review data case-by-case and evaluate:

- Changes in the watershed
- Changes in facility discharge and processes
- The most current 3 to 5 years of data, initially

- Data older than 3 to 5 years, if applicable
- Assumptions and requirements of existing TMDL WLAs (e.g. in comparison to current water quality criteria)
- Seasonality and flow periods
- The need to collect additional data through monitoring or other actions (e.g., when data issues are identified, such as outdated data, no data, insufficient data, non-representative data, or data not meeting quality objectives)
- Any other information that may help identify data grouping and analyses to appropriately develop permit limits

These data and potential groupings (e.g., flow periods, seasonality) may need to be statistically verified, as well as based on references and familiarity of the location, flow management, and other site-specific circumstances. Data older than five years is often used in permitting, especially water body flow data. Available and relevant data should be considered, but if data are excluded from the analyses an explanation should be provided in the fact sheet. This evaluation process provides permit writers a pathway to develop permit limits with accurate and contemporary information.

2.2 Statistical Software

DEQ's *Statistical Guidance for Determining Background Ground Water Quality and Degradation* (DEQ 2014) identifies that the development of robust statistical analysis requires clear documentation of software used in the analysis, including version numbers and relevant information on the software source and publisher. DEQ will avoid the use of nonstandard methodologies to minimize interpretational problems or inappropriate conclusions. All software should be well documented and widely accepted as to its utility in the kind of statistical analyses performed for developing effluent limits.

DEQ may utilize a variety of statistical software packages, including those necessary for performing Monte Carlo or other specific statistical analyses. EPA's ProUCL v.5.1 statistical software is an example of acceptable software due to its ease of use, documentation, acceptance, and availability. The software is available for free and can be downloaded at *https://www.epa.gov/land-research/proucl-software*. It is easy to install and includes analysis tools for generating summary statistics for evaluating a RPTE.

2.3 Analytical Methods

Throughout this section, the terms MDL and ML always refer to the MDL or ML identified in an IPDES permit.

Sampling and analytical methods used to determine compliance must conform to 40 CFR 136, which is referenced in IDAPA 58.01.02 and incorporated by reference in 58.01.25, unless otherwise specified in the IPDES permit. When used for compliance, procedures for conducting clean and ultra-clean metal analysis, and procedures for conducting biological tests must be based on EPA-approved procedures as described in IDAPA 58.01.02.090.02 – 03.

Quality control requirements for trace metals sampling and analysis are rigorous because of the high risk for inadvertent sample contamination. Trace level metals data can be compromised by contamination during standard sampling, filtration, storage, and analysis. Procedures referred to as “clean sampling” and “ultra-clean sampling” have been developed by EPA to provide guidance in planning and executing sample collection and analysis. Additional information is provided in the draft *Guidance on the Documentation and Evaluation of Trace Metals Data Collected for Clean Water Act Compliance Monitoring* (EPA 1996a) and *Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels* (EPA 1996b).

Issues may also arise regarding:

- Whether to use data that were collected using unofficial methods
- How to require monitoring and compliance of low limits when testing methods ~~to those low limits~~ are not EPA-approved

One example is Method 1668 for polychlorinated biphenyls (PCBs). This method is not yet promulgated by EPA, yet recommended for water quality assessment but not for compliance purposes (VDEQ 2009). A similar issue is present with mercury and more examples will occur with toxics rulemaking and lower water quality standards for these toxics. Detailed discussions on these evolving issues are presented in section 2.3.2 and sections 4 and 5.

Any test result used should be representative of current and projected effluent quality. If any significant process or analytical method changes occurred at a facility that could substantially affect the effluent characterization, then only data collected subsequent to those changes should be used for RPTE and WQBEL calculations. **However, all data must be submitted to DEQ with an explanation or qualifying reasons for data that may no longer be relevant. Permittees may not exclude any data from submission that would otherwise be required by a permit.** DEQ will present and document in the fact sheet, any data used in the evaluation of RPTE and disclose rejected data and the reasoning for the exclusion.

2.3.1 MDL and ML Definitions

Because many water quality criteria, as well as effluent and receiving water data, are at trace levels, analytical results of samples may yield concentrations not considered detectable (e.g., < MDL) or quantifiable (e.g., < ML) by the analytical method used by the laboratory. Consequently, data sets may include uncensored values (e.g., a measured or quantified value) and censored data (e.g., reported by the lab as below MDL or ML). The differences between MDL and ML, and how censored data are handled for RPTE and WQBEL calculations is an important component of the effluent development process (EPA 2005). The proper use of censored values in permit compliance determinations is also critical, and is addressed in sections 2.3 – 2.4.

This issue continues to evolve on both technical and policy levels, and may be revised as appropriate or adjusted on a permit-specific basis at DEQ’s discretion. DEQ is utilizing EPA definitions of MDL and ML in the absence of establishing its own list of approved test methods and definitions, with corresponding detection and quantitation levels. EPA defines MDL as (Appendix B of 40 CFR 136):

> …the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

EPA specifies that the laboratory is required to determine the MDL for each analyte in accordance with the procedures in that part.

EPA defines ML as (40 CFR 136):

> …the level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed.

EPA further identifies ML as (79 FR 49001):

> The term ''minimum level'' refers to either the sample concentration equivalent to the lowest calibration point in a method or a multiple of the method detection limit (MDL). Minimum levels may be obtained in several ways: They may be published in a method; they may be sample concentrations equivalent to the lowest acceptable calibration point used by a laboratory; or they may be calculated by multiplying the MDL in a method, or the MDL determined by a lab, by a factor…
>
> …EPA is considering the following terms related to analytical method sensitivity to be synonymous: ''quantitation limit,'' ''reporting limit,'' ''level of quantitation,'' and ''minimum level.''

2.3.2 Sufficiently Sensitive Methods

EPA's rulemaking, 79 FR 49001, requires NPDES applicants to use sufficiently sensitive EPA-approved analytical methods, where they exist, when submitting information required by a permit application quantifying the presence of pollutants in a discharge. The final rule also requires that, as a condition of permit development, to assure compliance with permit limitations, the permit include requirements to monitor according to sufficiently sensitive EPA-approved methods, where they exist.

Consistent with EPA's rulemaking, IDAPA 58.01.25.106.02.a identifies an EPA-approved method as sufficiently sensitive when:

- The method ML is at or below the level of the applicable water quality criterion for the measured pollutant or pollutant parameter; or
- The method ML is above the applicable water quality criterion, but the amount of the pollutant or pollutant parameter in a facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or
- ~~The method has the lowest ML of the analytical methods approved for the measured pollutant or pollutant parameter.~~
- ~~In this third situation, in which~~ When none of the EPA-approved methods for a pollutant can achieve the ML necessary to assess reasonable potential or to monitor compliance with a permit limit, applicants or permittees must use the method with the lowest ML among the EPA-approved methods for the pollutant, and this method would meet the definition of sufficiently sensitive.

Where an applicant can demonstrate that, despite a good faith effort to use a method that would otherwise meet the definition of sufficiently sensitive, the analytical results are not consistent with the QA/QC specifications for that method, DEQ may determine that the method is not performing adequately and the applicant should select a different method from the remaining EPA-approved methods that is sufficiently sensitive (IDAPA 58.01.25.106.02.b).

When there is no EPA-approved analytical method, and is not otherwise required by DEQ, the applicant may use any suitable method but must provide a description of the method. When selecting a suitable method, other factors such as a method's precision, accuracy, or resolution, may be considered when assessing the performance of the method (IDAPA 58.01.25.106.02.c).

Not all parameters have MDLs or MLs (e.g., temperature, pH). For EPA-approved methods that do not explicitly list MLs, the applicant or permittee can derive the minimum level from either the concentration of the lowest calibration standard in methods that dictate the concentrations of such standards, or as a multiple of the MDL or similar statistically-derived detection limit concept (79 FR 49001).

For example, EPA 1600 series method provides MLs. EPA guidance (1996c) suggests that an interim ML (IML) should be calculated when a method specified ML does not exist; the IML is equal to the MDL multiplied by 3.18 as:

$$IML = MDL \times 3.18$$

ML is more appropriate for methods that use calibration curves. IML is applicable to gravimetric methods (e.g., parameters such as Total Suspended Solids (TSS), hexane extractable materials (HEM)) and titration methods (e.g., parameters such as alkalinity, TKN). For example, EPA method 1664B for HEM defines the IML and ML, but there is no calibration curve used. Therefore an acceptable calibration point may not be applicable because the method is gravimetric.

Reporting levels, instead of IMLs, may be more appropriate for parameters such as Biochemical Oxygen Demand (BOD), temperature, and dissolved oxygen. The IML applied as a reporting level may also be applicable to methods using factory calibrated spectrophotometers (e.g. Hach methods used for COD, ammonia, nitrate, nitrite, and phosphorous). Whereas, temperature may be more appropriately defined as a level of sensitivity (e.g., +/- a tenth of a degree).

The method with the lowest detection limit may not always be appropriate. In situations where multiple EPA-approved methods are available for a pollutant, if the laboratory has demonstrated that it can achieve a method ML that is lower than the IPDES permit limit, then the laboratory method would be considered sufficiently sensitive even if it has a higher detection limit than another method. The applicant would then only need to show that the method it has selected has a method ML that is at least as sensitive as necessary to determine compliance with the water quality criterion, after accounting for allowable dilution (79 FR 49001).

For example, there are several different methods approved under 40 CFR 136 for the analysis of some pollutants with differing sensitivities and quantitation levels (e.g., mercury). It is important to apply the appropriate technique and ML for the specific pollutant and media being sampled. Different methods are appropriate for measuring mercury concentrations in receiving water than measuring mercury concentration in biosolids. Biosolids do not need Method 1631E, and requiring use of 1631E for biosolids would decrease the accuracy of the measurement due to the need for dilutions required to get the sample into the analytical range.

2.3.3 Calculating and Reporting Values < MDL or ML

Subsections 2.3.3.1 – 2.3.3.3 identify the procedures for IPDES permit writers and permittees to calculate and report effluent values.

2.3.3.1 Calculations Using Values < MDL or ML

To calculate average pollutant concentrations and average mass loads, assign zero (0) for each individual lab result that is less than the MDL, and use the numeric value of the MDL for each individual lab result that is between the MDL and the ML (EPA 2005).

2.3.3.2 Reporting Calculations of Average Values

If the resulting average pollutant concentration value is less than or equal to the MDL, report "less than {numeric value of the MDL}." If the average value is greater than the MDL but less than the ML, report "less than {numeric value of the ML}." If a value is equal to or greater than the ML, report and use the actual value. Compare the resulting average value to the compliance level in assessing compliance (EPA 2005).

2.3.3.3 Mass Calculations

To calculate average mass loads use Equation 1:

*Average Flow (mgd) * Average Concentration (mg/L) * 8.34 ((lbs * L)/(mg*MG)) = Average Mass (lbs/day)*

Equation 1. Average mass load.

Use the following when calculating mass load:

- When concentration data are below the MDL, use the MDL to calculate the mass load, and report as less than (<) the calculated mass. For example, if flow is 2 mgd and the reported sample result is <0.001 mg/L (the permit limits are expressed as 0.002 mg/L and 0.03 lbs/day):
  - Mass load on the DMR = 0.001 mg/L * 2 mgd * 8.34
  - Mass load on the DMR = 0.01668 lbs/day
  - Round to 0.02 (e.g., 0.02 provides the same unit of precision as the permit limit; 1/100 lbs/day)
  - Report "< 0.02 lbs/day")
- When concentration data are below the ML, use the ML to calculate the mass load, and report as less than (<) the calculated mass. For example, if flow is 2 mgd and the reported sample result is <0.005 mg/L (the permit limits are expressed as 0.006 mg/L and 0.1 lbs/day):
  - Mass load on the DMR = 0.005 mg/L * 2 mgd * 8.34
  - Mass load on the DMR = 0.0834 lbs/day
  - Round to 0.08 (e.g., 0.08 provides the same unit precision as the permit limit; 1/100 lbs/day)
  - Report "<0.08 lbs/day")
- When concentration data are equal to or greater than the ML, use the laboratory reported value to calculate the mass load.

2.4 Compliance with WQBELs below MDL or ML

If a RPTE exists, DEQ will establish WQBELs in a permit. At times, DEQ will calculate WQBELs that are below the MDL or ML (Figure 2). In those cases DEQ will establish a compliance evaluation level at the ML (EPA 2005). The permittee will monitor according to their permit, using an approved analytical method for the pollutant. DEQ will determine compliance with concentration and mass limits as follows:

- When the WQBEL is less than the MDL, effluent levels less than the MDL are in compliance with the WQBEL.
- When the WQBEL is less than the MDL, effluent levels greater than the MDL, but less than the ML, may be in compliance with the WQBEL, unless analytically and statistically confirmed to be above the MDL by a sufficient number of samples, analyses, and use of appropriate statistical techniques.
  - DEQ may require additional monitoring when effluent levels are between the MDL and the ML.
  - DEQ may include as a permit condition that analytical results above the MDL, but below the ML, will trigger an investigation and possible corrective actions.
- When the WQBEL is greater than the MDL, but less than the ML, effluent levels less than the ML are in compliance with the WQBEL.

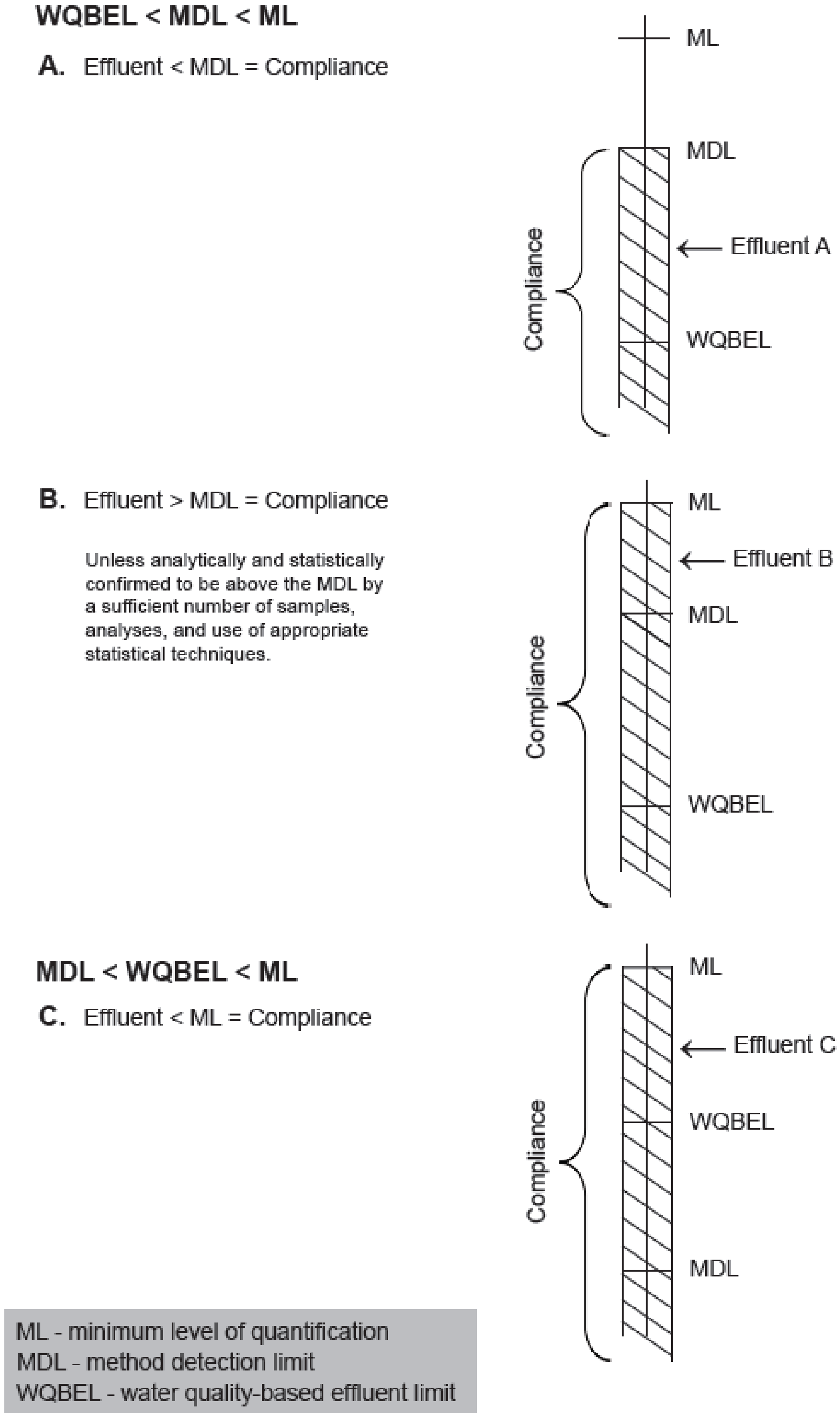

Figure 2. Compliance with water quality-based effluent limits that are below the MDL or ML.

2.5 Significant Figures, Rounding, and Precision

Much of the information in section 2.5 was adapted from the Oregon's *The Use of Significant Figures and Rounding Conventions in Water Quality Permit* (ODEQ 2013).

2.5.1 Significant Figures

Regardless of the measuring device, there is always uncertainty in a measurement. Significant figures include all of the digits in a measurement that are known with certainty plus one more digit, which indicates the uncertainty of the measurement. For example, a mass reported as 1.1 g indicates the measurement is accurate to the nearest 0.1 g (i.e., the actual mass is between 1.0 and 1.2 g), but if the measurement is 1.10 g it is accurate to the nearest 0.01 g. This has implications both for permit limit development and for establishing compliance with a permit limit. Table 1 lists the significant figure conventions used by the IPDES Program.

Table 1. IPDES conventions for significant figures.

Conventions	Examples	Number of Significant Figures
1. All non-zero digits (1-9) are counted as significant.	23	2
	231	3
2. All zeros between non-zero digits are always significant.	4308	4
	40.05	4
3. For numbers that do not contain decimal points, the trailing zeros may or may not be significant. In this situation, the number of significant figures is ambiguous, unless specified.	470,000	2 to 6
4. For numbers that do contain decimal points, the trailing zeros are significant.	0.360	3
	4.00	3
5. If a number is less than 1, zeros that follow the decimal point and are before a non-zero digit are not significant.	0.00253	3
	0.0670	3

As indicated in the third convention above, numbers that contain trailing zeros but do not contain decimal points can be problematic. For example, "10" could be either one or two significant figures. There is no way to know what was intended unless there is a note that explicitly states how many significant figures there are.

Similarly, the number of significant figures can depend on the notation use. For example, 4.7×10^5 has 2 significant figures, whereas 4.70000×10^5 has 6 significant figures. And significant figures and trailing zeros are handled differently in software programs (e.g., NetDMR drops trailing zeros; Excel converts "10." to "10") making the units very important when dealing with reporting).

The problem of how to interpret numbers with trailing zeros is pervasive enough that EPA changed the Maximum Contaminant Level (MCL) for arsenic in drinking water from 10 ppb to 0.010 ppm to clarify the number of significant figures associated with the MCL.

As a result, IPDES permits will identify for each effluent limit, the units of measure and significant figures that DEQ will use to determine compliance.

2.5.2 Rounding

In reporting results and calculating permit limits or mass loads, it is necessary to round the results to the correct number of significant figures. The IPDES Program will utilize a hybrid approach in which the rounding convention used for a number ending in 5 depends on the context. In reporting measured values (values obtained directly from a laboratory or field measurement), 5 is rounded to the nearest even number. For calculated values (results obtained by using mathematic calculations on a laboratory or field measurement), 5 is rounded up. Table 2 lists the IPDES rounding conventions used.

Table 2. IPDES conventions for rounding calculated and measured values.

Conventions for Rounding	Examples	
	Rounding Off Calculated Values	**Rounding Off Measured Values**
1. If the digit being dropped is 1, 2, 3 or 4, leave the preceding number as-is.	1.11 → 1.1 1.12 → 1.1 1.13 → 1.1 1.14 → 1.1	Same
2. For calculations: if the digit being dropped is 5, round the preceding digit up.	1.15 → 1.2 1.25 → 1.3	N/A
3. For measurements: If the digit being dropped is 5, round the preceding digit to the nearest even number (0 is considered an even number when rounding).	N/A	1.15 → 1.2 1.25 → 1.2
4. If the digit being dropped is 6, 7, 8 or 9, increase the preceding digit by one.	1.16 → 1.2 1.17 → 1.2 1.18 → 1.2 1.19 → 1.2	Same

A shorthand version of the information presented is as follows:
• Calculated values– the digit 5 should be rounded up, unless the permittee has chosen to follow the convention for measured values. The permittee must do so on a consistent basis.
• Measured values – the digit 5 should be rounded to the nearest even number.
The rounding methodology employed should be identified in the laboratory or monitoring QAPP.

For calculated results, rounding of 5 is consistent with the convention used by Microsoft Excel software, which is utilized extensively by the IPDES Program to perform Reasonable Potential Analysis (RPA)-related calculations. If commercial software packages and spreadsheets employ a different rounding routine, then the analyst should not change the results generated by the software. For measured values, rounding of 5 to the nearest even number is consistent with *Standard Methods for the Examination of Water and Wastewater* (APHA, AWWA, WEF 1999).

However, if a permit writer or permittee chooses to use the same convention for calculated values as for measured values, they may do so, provided they consistently do so. The rounding methodology employed should be identified in the laboratory or monitoring QAPP.

2.5.3 Reporting Significant Figures

Two types of permit limits include:

- Compliance is determined based on the results of a laboratory or field measurement; and

- Compliance is based on the results of a mathematical calculation of a laboratory or field measurement.

If compliance is established based on a laboratory or field measurement, the number of significant figures in the permit limit should be the same as the number of significant figures associated with the laboratory or field measurement methodology.

If compliance is determined based on the results of a calculation, the number of significant figures in the permit limit should be determined in a manner that is consistent with the IPDES conventions for determining the number of figures to report (Table 3).

Permit writers should include in IPDES permits, the following or similar language, clarifying how permittees should report significant figures on the discharge monitoring report (DMR) (also see Appendix A):

> The permittee shall report the same number of significant figures or precision as the permit limit for a given parameter. Regardless of the rounding conventions used by the permittee, the permittee shall use the conventions consistently, and shall ensure that consulting laboratories employed by the permittee use the same conventions.

Table 3. IPDES conventions for determining the number of figures to report.

Convention	Example
1. For multiplication or division. The number of significant figures in the result is equal to the smallest number of significant figures of the values used in the calculation.	2.5 x 3.42 = 8.55 becomes 8.6 2.5 has the fewest significant figures (two) so the final result has two significant figures.
2. For addition or subtraction. The number of decimal places in the result is equal to the number of decimal places in the least precise value used in the calculation. *Note*: the number of decimal places is equal to the number of digits to the right of the decimal point.	13.681 – 0.5 = 13.181 becomes 13.2 0.5 is reported to only one decimal place so the final answer has one decimal place. *Note*: the number of digits in the answer is determined by the number of decimal places in the least precise measurement, and not by the number of significant figures.
3. For calculations involving multiple arithmetic operations. The number of significant figures is determined by rules 1 and 2 above, with arithmetic operations performed in the following order: a. Operations in parentheses b. Exponents c. Multiplication d. Division e. Addition f. Subtraction In a situation with multiple operations it is important not to round answers after each intermediate step. Instead keep track of the right most digit that would be retained based on rules 1 and 2 above (shown in the example on the right by an underline). The order of operations is seldom an issue in permitting. This information is included for completeness.	(2.5 x 3.42) + 13.681 – 0.5 = 21.731 becomes 21.7 1) First do the operation in parenthesis (in this case multiplication – rule 1 ~~2~~ above) = 8.55 + 13.681 – 0.5 2) Next perform addition - Rule 2 ~~1~~ above = 22.231 – 0.5 3) Then subtraction – rule 2 ~~1~~ above = 21.731 all digits carried through = 21.7 final rounding In step 1, (based on rule 1 ~~2~~), 8.55 would only be reported to two significant figures (retaining one decimal place). In this case, one place to the right of the decimal is the limiting digit for steps 2 and 3, and therefore the final result is reported to one decimal place.
4. For values that are not considered. Values that are considered “exact” numbers are not included in the determination of the final number of significant figures. Here are some examples of exact values: **a. Design/production flow of a treatment facility.** By contrast, the measured flow at a facility is not an exact number and does affect the number of significant figures in a calculation. Measured flows at treatment plants typically have two significant figures. **b. Conversion factors.** These should be selected so that the number of digits is at least that associated with measured	**Example 1:** For a POTW with a design flow of 1.5 mgd, the mass load of a pollutant measured at 5.25 mg/L is calculated as follows: 5.25 mg/L x 1.5 mgd flow x 8.34 = 65.7 lbs The result contains three significant figures because the concentration of 5.25 contains three significant figures. The other numbers in the calculation, 1.5 mgd (design flow) and 8.34 (conversion factor), have no effect on the number of significant figures in the result. Note that if the mgd of the facility were measured at the plant rather than being supplied by the

values used in a calculation. c**. Values below the MDL or ML.** Where the permittee uses <{value of MDL} or < {value of ML} when averaging, the MDL and ML are considered "exact" numbers and are not included in the determination of the final number of significant figures. **d. Counted values such as:** i. Bacteria measurements ii. The number of samples iii. Values denoting time (days, months, etc.)	design engineer, then the number of significant figures associated with the flow would matter. Flow measurements typically have two significant figures. Example 2: What is the average of the following three concentrations: 4.6 mg/L, 2.3 mg/L and ≤ MDL or ML Where ML = 0.1 Answer: (4.6 + 2.3 + 0~~.1~~)/3 = ≤2.3 mg/L The number of significant figures is equal to the number of significant figures for the detected concentrations. The 0~~.1~~ MDL value and the 3 in the denominator (a counted value) do not affect the number of significant figures or decimal places in the final rounding.

2.5.4 Permit Calculation Examples

The following are examples of how these rules may apply when developing mass load limits or when determining compliance with monthly mass load limits.

1. Calculate a permit limit for the average daily mass load of ammonia.

Example

Facility information:

- Average dry weather design flow = 1.25 mgd
- Permit limit for ammonia (Total Ammonia as N) = 5.0 mg/L
- Conversion factor from mgd and mg/L to lbs/day = 8.34

The allowable mass load for ammonia from this facility is calculated as follows:

1.25 mgd x 5.0 mg/L x 8.34 = 52.13 lbs/day → 52 lbs/day

Comments:

The resulting permit limit has been rounded to 2 significant figures because of the 2 significant figures in the ammonia concentration permit limit (5.0 mg/L). The number of significant figures in the permit limit is unaffected by the number of digits in the design flow or the conversion factor. If the calculated result had been 52.5 lbs/day instead of 52.13 lbs/day, the permit limit would have been rounded up to 53 lbs/day.

Note that if the allowable ammonia concentration was greater than 10 mg/L, the permit limit would contain 3 significant figures instead of 2 (Appendix A).

2. Calculate the 7-day average concentration for ammonia.

Example

Facility information:

- Permit limit = 4.5 mg/L, sampled 4 times a week
- Measured concentrations = 0.5, 2.5, 12.7 mg/L and <0.1 mg/L

$(0.5 + 2.5 + 12.7 + 0)/4 = 3.925 \text{ mg/L} \rightarrow 3.9 \text{ mg/L}$

Comments:

The result has been rounded to 2 significant figures and is rounded because the permit limit contains 2 significant figures (4.5 mg/L).

Note that the lab result 12.7 contains more significant figures than the permit limit. However, this value is consistent with information provided in Appendix A. That is, ammonia values less than 10 mg/L should have 2 significant figures and 3 significant figures for values are greater than 10 mg/L. Also, 0.5, 2.5, and 12.7 mg/L only have one place to the right of the decimal so the result is reported to one decimal place (see convention 2 in Table 3).

Note that the nondetect is treated as zero and it does not affect the number of significant figures in the final result. The value of 4 in the denominator also has no affect because it is a counted number.

3. Determine if the following facility is in compliance with their permit limit for average daily mass load of ammonia of 38 lbs/day.

Example

Facility information:

- Average daily flow = 0.85 mgd
- Average daily concentration of ammonia (measured as Total Ammonia as N) = 5.0 mg/L
- Conversion factor from mgd and mg/L to lbs/day = 8.34

The allowable mass load for ammonia from this facility is calculated as follows:

$0.85 \text{ mgd} \times 5.0 \text{ mg/L} \times 8.34 = 35.5 \text{ lbs/day} \rightarrow 36 \text{ lbs/day}$

Comments:

The result has been rounded off to 2 significant figures because of the 2 significant figures in the ammonia concentration permit limit (5.0 mg/L). The number of significant figures in the average daily flow from the facility (measured at 0.85 mgd) would also be limiting if it was clear that appropriate rounding and significant figure conventions had been used to derive that number. Lastly, the conversion factor has no effect on the number of significant figures.

2.6 Sample Size, Data Normality, and Outliers

2.6.1 Sample Size

This section specifically addresses quantifiable measurements above the detection limit not affected by censoring. Procedures for dealing with censored data are discussed in sections 2.3–2.4. The quality and quantity of available monitoring data are two of the most important factors in determining effluent and water quality. Individual samples are only representative of water quality at a particular time in a particular location, which often varies seasonally or changes with time and location. The greater the number of independent samples collected over time, the more representative the characterization of the effluent or water quality. Larger sample populations also increase the statistical confidence in the evaluation of effluent and water quality. Valid statistical testing depends upon collection of adequate data. Statistical tests rely on using estimates of the true mean and true variance of a population. For example, the estimate of the true mean is the average of the data points collected. The estimate of the true standard deviation is the standard deviation of the data points collected.

The number of samples needed to conduct a statistical analysis depends on the site-specific conditions, which in turn controls the data variability. Some existing sample size guidance for permit writers, include:

- EPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance* (EPA 2009) recommends a minimum of 8 to 10 independent samples be available to estimate the standard deviation of a parametrically distributed statistical population (e.g., normal, gamma or lognormal distributions).
- EPA (2004) identifies a procedure for establishing an acceptable minimum number of samples using the technique described in *Statistical Methods for Environmental Pollution Monitoring* (Gilbert, 1987).
- EPA (1991) also recommends that for data sets where $n < 10$, the coefficient of variation (CV) is estimated to equal 0.6 or the CV is calculated from data obtained from a discharger. For less than 10 data points, the uncertainty in the CV is too large to calculate a standard deviation or mean with sufficient confidence.
- DEQ recommends collecting a minimum of 12 independent samples for most IPDES statistical analysis methods (DEQ 2014).

In stark contrast, a tolerance interval estimate for a nonparametric distribution may require a minimum of 59 independent data points to achieve 95% coverage[i] at 95% confidence (Conover 1999, EPA 2009, Gibbons 1994).

In other situations, such as the presence of a seasonal trend, the Seasonal Kendall Test requires a minimum of 3 years of monthly data, or 36 data points (Gilbert 1987). When quarterly data are sparse, the Kruskal-Wallis test can be used as long as there are at least 3 years of quarterly data collected in the same months (a minimum of 12 independent data points). To quantify serial correlation effects (temporal dependence), Harris et al. (1987) state that at least 10 years of quarterly data, or 40 data points, may be necessary.

Adequate sample size varies on a case-by-case basis and is a decision that must consider factors unique to each project and site. The goal of determining sample size for statistical

[i] where 95% of future samples will fall within the interval

analyses is to find the number of samples that provides adequate yet practically feasible evidence with which meaningful conclusions can be made. DEQ, in consultation with permittees, as appropriate, will make the final determination of what constitutes adequate sample size.

2.6.2 Data Normality

EPA has determined that daily measurements of many pollutants follow a lognormal distribution (EPA 2010). Procedures in this guide allow permit writers to project a critical effluent or background concentration (e.g., the 99th or 95th percentile of a lognormal distribution of effluent concentrations) from a limited data set using statistical procedures based on the characteristics of the lognormal distribution. These procedures use the number of available effluent data points for the measured concentration of the pollutant and the CV of the data set, which is a measure of the variability of data around the average, to predict the critical pollutant concentration. Figure 3 provides an example of a lognormal distribution of effluent pollutant concentrations and projection of a critical effluent pollutant concentration (C_d).

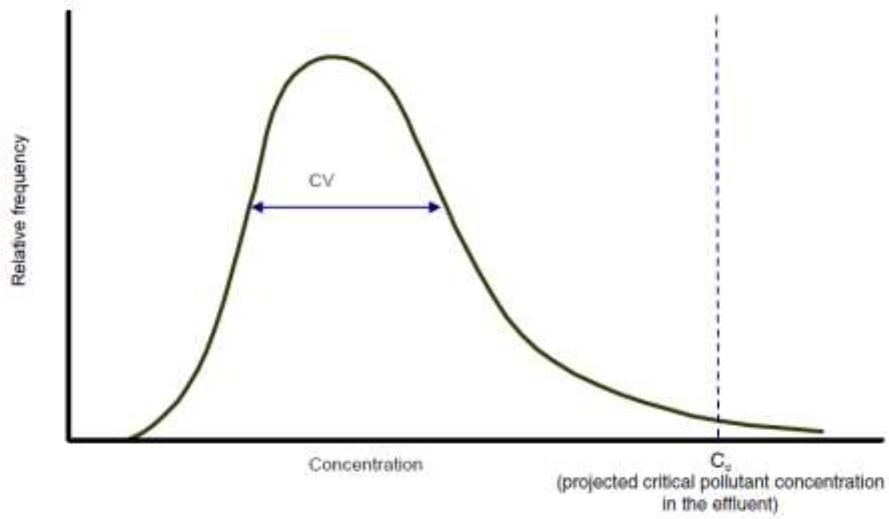

Figure 3. Example of lognormal distribution of effluent pollutant concentrations and projection of critical concentration (Cd) (EPA 2010).

For pollutants that do not follow a lognormal distribution, DEQ will rely on alternative procedures to determine the critical pollutant concentration (e.g., evaluate the distribution as gamma or non-parametric) (DEQ 2014; EPA 2009, 2013a, 2013b).

2.6.3 Outlier Analysis

In any effluent or water body data set, it is possible that outliers (anomalous results) will exist. Outliers can have one of three causes: (1) a measurement or recording error, (2) an observation from a different population, or (3) a rare event with a very low probability of occurrence. Outliers can be discarded from the data set with adequate justification. For example, a valid justification for removing an outlier might be the simultaneous occurrence of extreme values in four independent data sets on the same day. This type of event would strongly suggest either a field contamination issue or a lab error.

The EPA's Unified Guidance (EPA 2009) and ProUCL manuals (EPA 2013a, 2013b) provide additional guidance on how outliers should be handled. For example, EPA's ProUCL statistical software evaluates data with the Dixon's or Rosner's tests at a specified significance level (recommend 5%). Rosner's test is used for datasets with n ≥25 and Dixon's test is used for datasets with n < 25. Chapter 12 of EPA's Unified Guidance (EPA 2009) identifies the assumptions and requirements for Dixon's and Rosner's tests.

Outliers can also result from many factors other than a statistical anomaly. Examples may include the pursuit of treatment technology studies, optimization effort, and as a result of exploring better treatment performance. Treatment process testing can provide some unexpected results and looking at data in different ways can be useful for improving operations. Before undertaking any performance enhancing or testing activities, permittees should coordinate with DEQ. This coordination will provide upfront notice to DEQ and explain why, operationally, some data may be different.

In addition, DEQ will adhere to the following guidelines for outlier inclusion/exclusion and correction measures:

- If an error in transcription, dilution, or analytical procedure can be identified and the correct value recovered, then the observation should be replaced by its corrected value and further statistical analysis performed with the corrected value.
- If the observation is in error but the correct value cannot be determined, then the observation should be removed from the data set and further statistical analysis performed on the reduced data set. The observation removal and the reason for its removal should be documented in the fact sheet when reporting results of the analysis.
- If no error in the value can be documented, then it should be assumed that the observation is a true but extreme value. In this case, the value should not be altered or removed. However, it may be helpful to obtain another observation in order to verify or confirm the initial measurement.

Permit-required data that have been determined to be outliers and excluded from analyses must be explained in the fact sheet so as not to be excluded from the administrative record.

3 Determining Technology-Based Effluent Limits (TBELs)

Effluent limits are restrictions imposed by DEQ on the quantities, discharge rates, and concentrations of pollutants that are discharged from point sources. Establishing effluent limits based on available pollutant control technologies is the first step in reducing the discharge of pollutants to waters of the United States in Idaho. These ~~Technology-Based Effluent Limits (~~TBELs~~)~~ are the treatment requirements set under CWA §301(b), and represent the minimum level of control used to achieve these limits. The effluent limit determination and derivation process carefully considers cost of applying control technologies, the age of equipment, processes employed, engineering aspects of control technologies, and non-water quality environmental impacts at each facility applying for an IPDES permit. The resulting effluent limits may be expressed as mass- or concentration-based values. TBELs reflect process controls and do not consider the receiving water's ability to assimilate the discharged pollutants.

The impact to receiving water will be determined using a ~~Reasonable Potential Analysis (~~RPA~~)~~. Any impacts to the receiving water will be considered when WQBELs are assessed (Section 4).

The more stringent of the two effluent limit types, technology-based or water quality-based, must be identified in an IPDES permit and met by the discharger.

There are two general approaches to deriving TBELs. The permit writer can use the federal effluent limitation guidelines (ELG) and standards, if they are applicable and appropriate, or, if no applicable ELG or standard exists, then develop effluent limits specifically for an individual discharger or pollutant on a case-by-case basis employing Best Professional Judgement (BPJ). It is possible that a permit may contain effluent limits derived from either or both methods.

Point source pollutant discharges to surface water requiring an individual permit are typically either a POTW or non-POTW (e.g., industrial, commercial, mining, or silvicultural). The following subsections will first address establishing TBELs for POTWs in Subsection 3.1, briefly touch upon industrial discharges to POTWs in Subsection 3.1.4, followed by Non-POTW dischargers in Subsection 3.2.

3.1 TBELs for Publicly Owned Treatment Works (POTWs)

The largest category of dischargers requiring individual IPDES permits is POTWs. A POTW, as defined in IDAPA 58.01.25.010.73, includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. A POTW also includes the sewage collection system, pipes, mains, lift stations, and other conveyances that deliver wastewater to the facility. The term also means the municipality as defined in the Clean Water Act section 502(4), which has jurisdiction over the indirect discharges to and the discharges from such a treatment works.

IDAPA 58.01.25.010.55 provides a definition of municipality as:

> A city, town, county, district, association, or other public body created by or under state law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under the Clean Water Act section 208.

The EPA has established TBELs for POTWs that set minimum technology-based limits. These minimum levels are called secondary treatment and equivalent to secondary treatment standards and are codified in 40 CFR 133 (IBR). In general, POTWs are required to meet discharge limits based on secondary treatment standards. However, if the facility meets specific criteria described in Section 3.1.1.2, then it may be eligible for equivalent to secondary treatment standards.

3.1.1 Secondary and Equivalent to Secondary Treatment

IDAPA 58.01.25.302.03 requires that IPDES permits include applicable technology-based limits and standards, while regulations at 40 CFR 125.3(a)(1) (IBR), state that TBELs for POTWs must be based on secondary treatment standards (which includes the “equivalent to secondary treatment standards”) specified in 40 CFR 133. The following sections will explain how to determine TBELs for the conventional pollutants BOD_5, TSS, and pH discharged by POTWs.

3.1.1.1 Secondary Treatment Standards

In 40 CFR 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 BOD_5, TSS, and pH.

Table 4 presents the secondary treatment standards established in 40 CFR 133.

Table 4. Secondary treatment standards.

Parameter	Average Concentration	
	30-day	7-day
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
Percent removal (BOD_5 and TSS)	≥85%	NA
pH	Within the range 6.0 to 9.0 standard units (instantaneous minimum or maximum limits)[a]	

a. Unless the POTW demonstrates (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

Parameter	Average Concentration		Removal Efficiency	Average Load Limits	
	30-day	7-day	30-day	30-day	7-day
Biochemical oxygen demand (BOD_5)	30 mg/L (or 25 mg/L $cBOD_5$)	45 mg/L (or 40 mg/L $cBOD_5$)	Not less than 85%	lb/day	NA
Total suspended solids (TSS)	30 mg/L	45 mg/L	Not less than 85%	lb/day	NA
pH[a]	NA		NA	$6.0 \le x \le 9.0$ su	NA

a. Unless the POTW demonstrates (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 6.5 or greater than 9.0.

Notes: milligrams per liter (mg/L); standard unit (su); pounds per day(lb/day); not applicable (NA)

3.1.1.2 Equivalent to Secondary Treatment Standards

Some widely used and inexpensive wastewater treatment processes, like trickling filters and waste stabilization ponds, provide significant pollutant reduction, but their consistency may not always attain the levels and efficiencies specified in the secondary treatment standards. These processes are typically found serving small communities which may have difficulty implementing more expensive treatment processes. These processes may not consistently achieve the secondary treatment standards for TSS and BOD_5, or attain the 85% reduction requirement under extreme conditions. During warm, clear weather, waste stabilization ponds tend to experience algal blooms, resulting in excessive TSS. Similarly, trickling filters may experience excessive biofilm growth on the media which then sluffs off, contributing to excessive TSS. Conversely, in cold weather, both waste stabilization ponds and trickling filters may have lower efficiency, resulting in higher BOD_5 values in the effluent. These effluent performance deficiencies contribute to lower removal efficiencies.

Congress recognized that small communities were ill-suited to shoulder the expense of upgrading to processes that meet secondary treatment standards and increased periodic maintenance costs. Also recognizing that the secondary treatment standards may be overly restrictive for these communities, Congress authorized EPA to develop treatment standards suitable for these processes. A wastewater facility that uses these treatment processes must meet certain criteria described later in this section before these equivalent treatment standards, shown in Table 5, should be used in the permit.

Table 5. Equivalent to secondary treatment standards.

Parameter	Average Concentration	
	30-day	7-day
BOD_5	45 mg/L (or 40 mg/L $cBOD_5$)	65 mg/L (or 60 mg/L $cBOD_5$)
TSS	45 mg/L	65 mg/L
Percent removal (BOD_5 & TSS)	≥65%	NA
pH	Within the range 6.0 to 9.0 standard units (instantaneous minimum or maximum limits)[a]	

a. Unless the POTW demonstrates (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

Parameter	Average Concentration		Removal Efficiency	Average Load Limits	
	30-day	7-day	30-day	30-day	7-day
Biochemical oxygen demand (BOD_5)	45 mg/L (or 40 mg/L $cBOD_5$)	65 mg/L (or 60 mg/L $cBOD_5$)	65%	lb/day	NA
Total suspended solids (TSS)	45 mg/L	65 mg/L	65%	lb/day	NA
pH[a]	NA		NA	6.0 ≤ x ≤ 9.0 su	NA

a. Unless the POTW demonstrates (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 6.5 or greater than 9.0.
Notes: milligrams per liter (mg/L); standard unit (su); pounds per day (lb/day); not applicable (NA)

The equivalent to secondary treatment standards are not automatically granted to facilities that use the processes identified, or meet other criteria that allows equivalent to secondary treatment standards to be applied in their permit. 40 CFR 133.105(f) specifies that the equivalent to secondary treatment standards may be made more restrictive (e.g. 30-day average concentration for BOD_5 and/or TSS ≤ 37 mg/L, and/or 30-day removal efficiency ≥ 75%), if the permit writer determines that the facility can attain higher effluent quality through proper operation and maintenance. Alternatively, Idaho may establish an Alternative State Requirement (ASR) for facilities that cannot consistently meet the equivalent to secondary standards in a contiguous area. This will be addressed in Section 3.1.2. Additionally, if the POTW is a new facility, and the facility's design capacity, in conjunction with geographical and climatic conditions, and proper operation and maintenance indicate that effluent limits more restrictive than equivalent to secondary treatment standards are warranted, the permit may reflect this.

Criteria to Qualify for Equivalent to Secondary Treatment Standards

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

Criterion #1—Principal Treatment Process: Its principal treatment process must be a trickling filter or waste stabilization pond (i.e., the largest percentage of BOD_5 and TSS removal is from a trickling filter or waste stabilization pond system).

Criterion #2—Consistently Does not Achieve Secondary Treatment Standards: Demonstrate that the BOD_5 and TSS effluent concentrations consistently achievable through proper operation and maintenance of the treatment works cannot attain the secondary treatment standards set forth in Table 5. The regulation at 40 CFR 133.101(f) defines "effluent concentrations consistently achievable through proper operation and maintenance" as:

- For a given pollutant parameter, the 95^{th} 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.
- A 7-day average value equal to 1.5 times the 30-day average value derived in the bullet above.

Some facilities might meet this criterion only for the BOD_5 limits or only for the TSS limits. DEQ believes that it is acceptable to adjust the limits for only one parameter (BOD_5 or TSS) if the effluent concentration of only one of the parameters is demonstrated to consistently not attain the secondary treatment standards.

Criterion #3—Provides Significant Biological Treatment: The treatment works provides significant biological treatment of municipal wastewater. The regulations at 40 CFR 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.

Each facility should be considered on a case-by-case basis to determine whether it meets those three criteria. To apply the criteria, enough influent, effluent, and flow data from the facility should be collected 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, then data for a period that is representative of the current discharge quality may be necessary to establish limits.

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* (EPA 1985) 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, then the solution to the problem is construction, not effluent limit adjustments.

3.1.2 Adjustments to Equivalent to Secondary Treatment

The adjustments to limits presented in this section are applicable to properly operated and maintained POTWs that use trickling filters or waste stabilization ponds as their primary treatment process. Additionally, the facilities must be located in a contiguous area of ~~the state~~ Idaho where other POTWs, similarly configured, experience the same difficulty meeting the BOD_5 and TSS limits.

The revised secondary treatment regulations (adopted in 1984) include provisions in 40 CFR 133.105(d) allowing flexibility to address potential variations in facility performance arising from geographic, climatic, or seasonal conditions. The provisions allow modifying the maximum allowable concentrations of both BOD_5 and TSS for trickling filter facilities and for BOD_5 for waste stabilization pond facilities. The limits are set at levels consistently achievable through proper operation and maintenance [40 CFR 133.101(f)] by the median facility in a representative sample of facilities within the appropriate contiguous geographical area that meet the definition for facilities to be eligible for equivalent to secondary treatment standards. These relaxed limits are classified in 40 CFR 133.105(d) as Alternative State Requirements (ASRs). Establishing these ~~relaxed~~ limits requires both the public's input and approval by EPA. Idaho does not currently have approved ASRs and does not foresee proposing ASRs. ~~These relaxed limits are classified in 40 CFR 133.105(d) as ASRs.~~

The permit writer can adjust the maximum allowable TSS concentration for waste stabilization ponds upward from those specified in equivalent to secondary treatment standards to conform to TSS concentrations achievable with waste stabilization ponds. The regulation, found at 40 CFR 133.103(c), defines "SS concentrations achievable with waste stabilization ponds" as the effluent concentration achieved 90 percent of the time within an appropriate contiguous geographical area by waste stabilization ponds that are achieving the levels of effluent quality for BOD_5 specified in 40 CFR 133.105(a)(1) (45 milligrams per liter [mg/L] as a 30-day average). This higher TSS concentration requires EPA approval. 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.

3.1.3 Applying Secondary and Equivalent to Secondary Treatment Standards

Determining whether secondary treatment standards or equivalent to secondary standards apply to a POTW and determining the specific discharge limits for the facility based on either set of standards can be a complex process. Compliance with established permit limits requires that both influent and effluent ~~limits~~ must be measured in order to calculate the percent removal. This section presents a protocol to establish TBELs for POTWs. A synopsis of this protocol is presented in Figure 4.

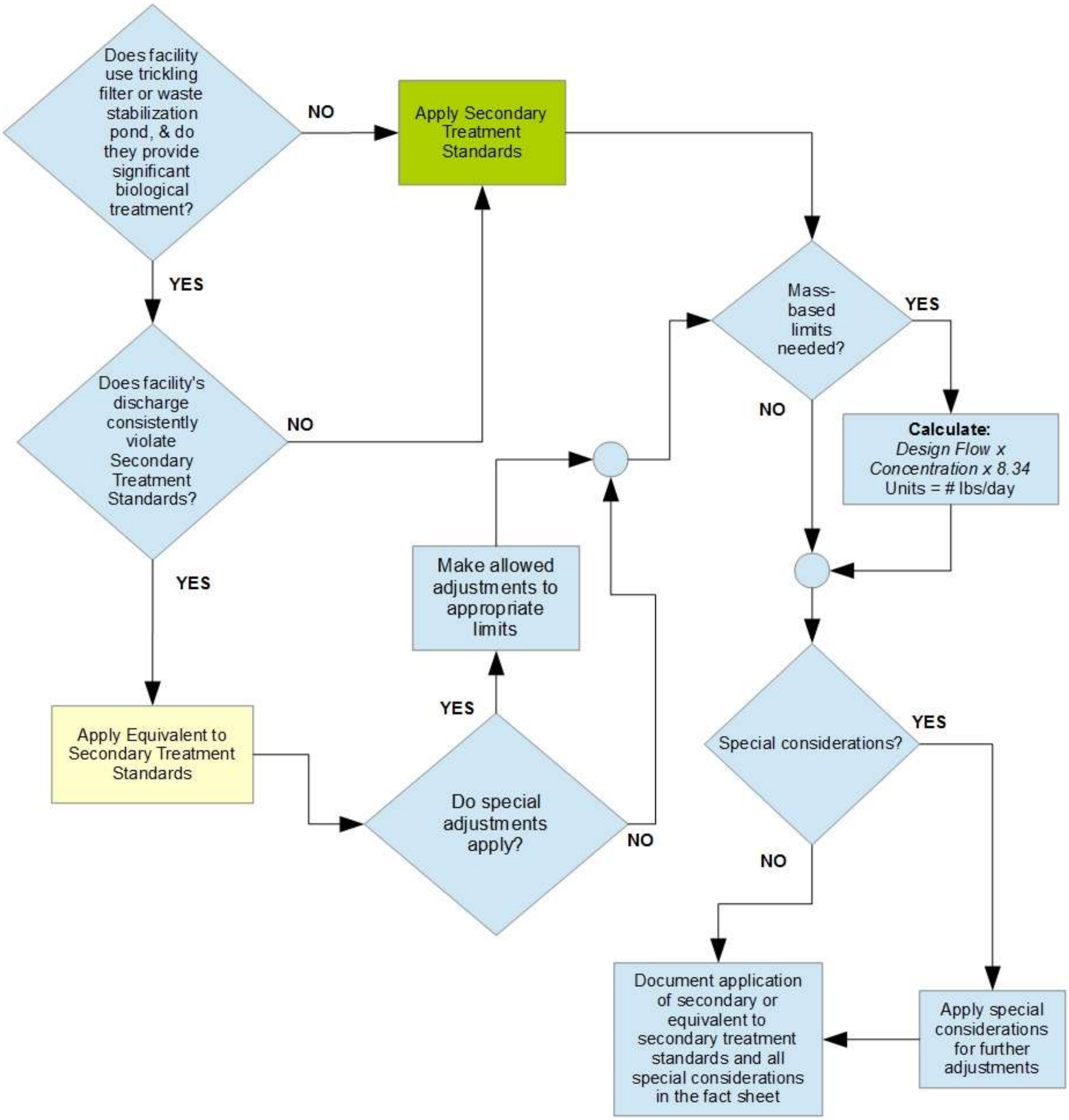

Figure 4. Secondary and equivalent to secondary treatment standards decision tree.

3.1.3.1 Determine Appropriate Standards to Apply

Initially, a facility evaluation must be completed to determine whether secondary treatment, equivalent to secondary treatment, or some adjustment to the equivalent to secondary treatment standards are applicable for the facility. New facilities using tricking filters or waste stabilization ponds will, with a high probability, achieve secondary treatment standards. The ultimate design capability of the treatment processes (waste stabilization ponds, trickling filters, or both), geographical and climatic conditions, and the performance capabilities of recently constructed facilities in similar situations should be considered when determining which standard applies.

Once the standard (secondary or equivalent to secondary) is selected, it can be used to set the permit limits. Subsection 3.1.3.2 will address the development of permit limits if secondary treatment standards are deemed appropriate. If equivalent to secondary treatment standards are deemed appropriate, then follow subsection 3.1.3.3 to address permit limit development.

3.1.3.2 Calculate Effluent Limits Based on Secondary Treatment

If a permit writer deems secondary treatment standards are appropriate for the POTW, then the following procedures will be used to establish concentration and mass based limits. If the secondary treatment standards do not apply, then the permit writer will move on to Section 3.1.3.3, Calculating Effluent Limits Based on Equivalent to Secondary Treatment Standards.

Application of secondary treatment standards is straightforward. If these standards apply, then the permit should contain the permit limits listed in Table 5. These limits will be used to calculate the load limits for the permit.

~~Table 6. Effluent limits calculated from secondary treatment standards.~~

~~Parameter~~	~~Average Concentration~~	
	~~30-day~~	~~7-day~~
~~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~~
~~Percent removal (BOD_5 & TSS)~~	~~≥85%~~	~~NA~~
~~pH~~	~~Within the range 6.0 to 9.0 standard units (instantaneous minimum or maximum limits)[a]~~	

~~a. Unless the POTW demonstrates (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~~

First, the secondary treatment standards are stated as 30-day and 7-day averages, whereas IDAPA 58.01.25.303.04 requires that effluent limits for POTWs be expressed, unless impracticable, as average monthly and average weekly limits. The IPDES regulations define average monthly (or average weekly) discharge limits as the average of daily discharges over a calendar month (or week), calculated as the sum of all daily discharges measured during a calendar month (or week) divided by the number of daily discharges measured during that month (or week). Consequently, it is recommends that the 30-day and 7-day average secondary treatment standards be used as average monthly (calendar month) and average weekly (calendar week) discharge limits.

Second, IDAPA 58.01.25.303.06 requires that all permit limits, 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 limits.
- When applicable standards and limits are expressed in terms of other units of measure.
- If in establishing permit limits on a case-by-case basis under 40 CFR 125.3, limits 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. 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 these standards. Thus, mass-based discharge limits are not specifically required to implement secondary treatment standards, yet there may be valid reasons to include mass-based limits in the permit. Including both concentration and mass-based limits may be necessary to safeguard the environment and human health. IDAPA 58.01.25.303.02 requires using the POTW's design flow rate to calculate limits. To calculate a mass-based limit for a POTW (in pounds per day [lb/day]) the equations and procedures presented in Equation 2 should be followed.

POTW design flow (mgd)	X	Concentration-based limits (mg/L)	X	Conversion factor 8.34 (lb x L/mg x millions of gallons)

Equation 2. POTW secondary treatment standard mass-based limit calculations.

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

$$\text{Mass-based limits} = \text{POTW design flow} \times \text{Concentration-based limits} \times \text{Conversion Factor}$$

BOD_5

$$Average\ Monthly = (2.0\ mgd) \times \left(30\frac{mg}{L}\right) \times \frac{8.34\ (lb * L)}{(mg * millions\ of\ gallons)} = 500\ lb/da$$

$$Average\ Weekly = (2.0\ mgd) \times \left(45\frac{mg}{L}\right) \times \frac{8.34\ (lb * L)}{(mg * millions\ of\ gallons)} = 750\ lb/day$$

TSS

$$Average\ Monthly = (2.0\ mgd) \times \left(30\frac{mg}{L}\right) \times \frac{8.34\ (lb * L)}{(mg * millions\ of\ gallons)} = 500\ lb/day$$

$$Average\ Weekly = (2.0\ mgd) \times \left(45\frac{mg}{L}\right) \times \frac{8.34\ (lb * L)}{(mg * millions\ of\ gallons)} = 750\ lb/day$$

3.1.3.3 Calculate Effluent Limits Based on Equivalent to Secondary Standards

For facilities that qualify for equivalent to secondary standards for any pollutant, effluent limits must meet the requirements specified in 40 CFR 133.105 and summarized above in Table 5 (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 40 CFR 133.105(f) require the permit writer to include more stringent limits when the permit writer 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. This is 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, which would enable the treatment works to achieve more stringent limits than the least stringent effluent quality allowed by the equivalent to secondary standards. The regulations at 40 CFR 133.101(f) define, "effluent concentrations consistently achievable through proper operation and maintenance" as the 95^{th} percentile value for the 30-day average effluent quality achieved by a treatment works in a period of at least two years, excluding values attributable to upsets, bypasses, operational errors, or other unusual conditions. The 7-day average value is set equal to 1.5 times the 30-day average value. As with limits based on secondary treatment standards, limits based on equivalent to secondary standards are expressed as average monthly (calendar month) and average weekly (calendar week) limits. Mass balance calculations for equivalent to secondary standards are presented below using Equation 3.

A POTW with a design flow of 1.25 mgd would have mass-based limits calculated from equivalent to secondary treatment standards as follows

$$\text{Mass-based limits} = \text{POTW design flow} \times \text{Concentration-based limits} \times \text{Conversion Factor}$$

Equation 3. Mass-based limits.

BOD_5

$$Average\ Monthly = (1.25\ mgd) \times \left(45\frac{mg}{L}\right) \times \frac{8.34\ (lbs * L)}{(mg * millions\ of\ gallons)} = 470\ lbs/day$$

$$Average\ Weekly = (1.25\ mgd) \times \left(65\frac{mg}{L}\right) \times \frac{8.34\ (lbs * L)}{(mg * millions\ of\ gallons)} = 680\ lbs/day$$

TSS

$$Average\ Monthly = (1.25\ mgd) \times \left(45\frac{mg}{L}\right) \times \frac{8.34\ (lbs * L)}{(mg * millions\ of\ gallons)} = 470\ lbs/day$$

$$Average\ Weekly = (1.25\ mgd) \times \left(65\frac{mg}{L}\right) \times \frac{8.34\ (lbs * L)}{(mg * millions\ of\ gallons)} = 680\ lbs/day$$

If an existing facility does not have sufficient data to establish past performance, a compliance schedule item should be included in the permit that requires monitoring and reporting to generate the necessary data. IDAPA 58.01.25.201.02 provides provisions allowing the permitting authority to reopen and, if necessary, modify the permit after reviewing the additional data submitted by the discharger (201.02.c.ii).

3.1.3.4 Apply Special Considerations and Adjustments

40 CFR 133 allows the permit writer to make further adjustments when calculating effluent limits 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 limits or percent removal requirements. The calculated limits, after making such adjustments, are the final TBELs for the POTW.

3.1.3.4.1 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 both the carbonaceous biochemical oxygen demand and the nitrogenous biochemical oxygen demand. During nitrification, nitrifying bacteria use a large amount of oxygen to consume nitrogenous oxygen demanding substances (e.g. unoxidized ammonia, urea, and proteins) and convert these to oxidized nitrate. For wastewaters with significant nitrogen content, basing permit limits on $cBOD_5$ instead of BOD_5 eliminates the impact of nitrification on discharge limits and compliance determinations. The $cBOD_5$ test can provide accurate information on treatment plant performance in many cases and, 40 CFR 133 allows for the use of $cBOD_5$ limits in place of BOD_5 limits 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. Permits can specify these $cBOD_5$ limits along with $cBOD_5$ monitoring requirements in any POTW permit requiring performance based on secondary treatment standards [40 CFR 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 $cBOD_5$ limits, permit writers may require $cBOD_5$ instead of BOD_5 and specify $cBOD_5$ limits and monitoring requirements when applying equivalent to secondary standards.

3.1.3.4.2 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 40 CFR 133.104(b) allow permit limits for COD or TOC instead of BOD_5 if a long-term BOD_5:COD or BOD_5:TOC correlation has been demonstrated. If the applicant has sufficient data to establish a correlation between BOD_5 and either COD or TOC, then these alternate monitoring methods may be included in the permit.

3.1.3.4.3 Adjustments for Industrial Contributions

Under 40 CFR 133.103(b), treatment works receiving wastes from industrial categories with ELGs and standards or pretreatment 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 40 CFR 133, can qualify to have their 30-day BOD_5 or TSS limits adjusted upward provided that the following are true:

- The permitted discharge of pollutants for the applicable industrial category is not greater than the limits in ELGs for the industrial category.
- The flow or loading introduced by the industrial category exceeds 10% of the design flow or loading to the POTW.

When making this adjustment, the 40 CFR 133 values for BOD_5 and TSS should be adjusted proportionately using a flow-weighted or loading-weighted average of the two concentration limits (i.e., the limits developed from effluent guidelines for the industrial facility and the secondary or equivalent to secondary limits).

3.1.3.4.4 Adjustments to Percent Removal Requirements

The 85% 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 40 CFR 133.103(a), (d) and (e) provide that, under certain circumstances, less stringent limits for BOD_5 and TSS percent removal may be established. 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 limits during wet-weather events [40 CFR 133.103 (a)] and, under certain conditions, less stringent percent removal requirements or a mass loading limit instead of a percent removal requirement during dry weather [40 CFR 133.103 (e)].

  Determining whether any attainable percentage removal level can be defined during wet weather and, if so, what the level should be must be evaluated on a case-by-case basis. To qualify for a less stringent percent removal requirement or substitution of a mass limit during dry weather, the discharger must satisfactorily demonstrate the following:

  - The facility is consistently meeting, or will consistently meet, its permit effluent concentration limits, but cannot meet its percent removal limits because of less concentrated influent.

  - 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.
  - 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 40 CFR 35.2005(b)(28). This regulation defines non-excessive 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 regulation at 40 CFR 133.103(e) includes 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 40 CFR 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 limit instead of the percent removal requirement provided the treatment plant demonstrates all of the following [40 CFR 133.103(d)]:
  - The facility is consistently meeting or will consistently meet its permit effluent concentration limits but cannot meet its percent removal limits because of less concentrated influent wastewater.
  - To meet the percent removal requirements, the facility would have to achieve significantly more stringent limits than would otherwise be required by the concentration-based standards.
  - The less concentrated influent wastewater does not result from excessive 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 40 CFR 35.2005(b)(16), plus the additional criterion that flow is non-excessive if the total flow to the POTW (i.e., wastewater plus I/I) is less than 275 gallons per capita per day.
  - The regulation at 40 CFR 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 non-excessive I/I in 40 CFR 35.2005(b)(28) and 40 CFR 35.2005(b)(29).

3.1.3.5 Document the Application Standards, Adjustments, and Considerations in the Fact Sheet

The permit writer will clearly document in an IPDES POTW permit fact sheet:

- The application of secondary or equivalent to secondary treatment standards
- The data and information used to determine whether secondary treatment standards or equivalent to secondary treatment standards apply

- How that information was used to derive the permit's effluent limits
- All adjustments and special considerations

The information in the fact sheet will provide the IPDES permit applicant and the public a transparent, reproducible, and defensible description of how the IPDES permit properly incorporates secondary treatment standards.

3.1.4 Pretreatment Standards

The National Pretreatment Program authorizes a POTW to control industrial discharges to its facility through a DEQ-approved pretreatment program. These controls are developed to protect the POTW's equipment and personnel from damage. Regulatory national pretreatment standards that apply to a POTW's IUs include prohibited discharges, categorical standards, and local limits.

POTWs, or a group of POTWs operated by the same entity, with a total design flow of more than 5 mgd and receiving industrial pollutants that may cause pass through or interference are required to establish a pretreatment program under IPDES. In some cases, a POTW with a total design flow of less than 5 mgd may be required to establish a pretreatment program if the nature or volume of the industrial discharge causes POTW treatment process upsets, effluent limit violations, contamination of municipal sludge, or other circumstances as warranted. All POTWs meeting the above criteria must submit a pretreatment program for DEQ evaluation and approval within one year of written notification from DEQ for the need of a Pretreatment Program.

Prohibitions and categorical standards are designed to provide a minimum acceptable level of control over IU discharges. Site specific controls can be developed and enforced by the POTW through local limits. DEQ will not develop or approve a POTW's local limits but will evaluate the POTW's local limits development processes for appropriateness during program review. Therefore, local limits are not discussed here. For additional information about the development of local limits, see EPA's Local Limits Development Guidance (EPA 2004).

~~The National Pretreatment Program consists of three types of regulatory national pretreatment standards that apply to an industrial user (IU):~~

- ~~Prohibited discharges~~
- ~~Categorical standards~~
- ~~Local limits~~

~~POTWs are not typically designed to treat toxic or non-conventional pollutants present in industrial wastewater. The introduction of these pollutants into the POTW by IUs can result in a number of costly operational issues, including damage to equipment, contamination of sludge, increased sludge disposal cost, and violation of a POTW's IPDES permit. In certain cases, a POTW may be required to develop a pretreatment program to mitigate the effects of toxic and non-conventional pollutant discharges from IUs.~~

~~POTWs, or a group of POTWs operated by the same entity, with a total design flow of more than 5 million gallons per day (mgd) and receiving industrial pollutants that may cause pass through or interference are required to establish a pretreatment program under IPDES. In some cases, a POTW with a total design flow of less than 5 mgd may be required to establish a pretreatment program under 40 CFR 403.8(a) if it is determined that the nature or volume of the industrial~~

~~discharge causes POTW treatment process upsets, effluent limit violations, contamination of municipal sludge, or other circumstances as warranted. All POTWs meeting the above criteria must submit a pretreatment program for DEQ evaluation and approval within one year of written notification from DEQ for the need of a Pretreatment Program.~~

3.1.4.1 Prohibited Discharges

Prohibited discharges, comprised of general and specific prohibitions, apply to all industrial users regardless of the size or type of operation. A user may not introduce into a POTW any pollutant(s) which causes pass through or interference. These general prohibitions and the specific prohibitions below apply to each user introducing pollutants into a POTW whether or not the user is subject to other National Pretreatment Standards or any national, state, or local pretreatment requirements.

- General prohibitions [40 CFR 403.5(a)] forbid the discharge to a POTW of any pollutant that causes pass through or interference. ~~Pass through means a discharge that causes a violation of any requirement of the POTW's IPDES permit. Interference refers to a discharge that inhibits or disrupts the POTW, its treatment process or operations, or its sludge processes and that leads to a violation of the IPDES permits or any other applicable federal, state, or local regulation.~~
- Specific prohibitions [40 CFR 403.5(b)(1) to (8)] are ~~eight~~ categories of pollutant discharges that shall not be introduced to POTWs that are volatile, explosive, corrosive, or a hazard to the health and safety of personnel ~~forbid the following eight categories of pollutant discharges to POTWs:~~
  - ~~Pollutants that create fire or explosion hazards~~
  - ~~Pollutants that will cause structural damage due to corrosion~~
  - ~~Pollutants that will cause obstructions in the flow of discharges to the POTW~~
  - ~~Pollutants released at excessive rates of flow or concentrations~~
  - ~~Excessive heat in amounts that inhibit biological activity~~
  - ~~Certain oils that cause pass through or interference~~
  - ~~Pollutants that result in the presence of toxic gases, vapors, or fumes that may cause acute worker health and safety problem~~
  - ~~Trucked or hauled pollutants, except at discharge points designated by the POTW~~

3.1.4.2 Categorical Standards

Categorical standards apply to specific process wastewater discharges from particular industrial categories. These are uniform, technology-based, and applicable nationwide. Developed by the EPA, these standards apply to specific categories of IUs and limit the discharge of specified toxic and non-conventional pollutants to POTWs. Expressed as numerical limits and management standards, the categorical standards are found at 40 CFR 405 through 471. They include specific limitations for 35 industrial sectors. Appendix B of this ELDG contains a list of pollutants regulated by categorical pretreatment standards.

~~The prohibitions and categorical standards are designed to provide a minimum acceptable level of control over IU discharges. They do not, however, take into account site-specific factors at POTWs that may necessitate additional controls. For example, a POTW with stringent water quality based discharge limits may need to exert greater control over IU discharges to comply with its permit. This additional control can be obtained by establishing local limits.~~

3.1.4.3 Local Limits

Local limits are site-specific limits developed by the POTW to enforce general and specific prohibitions on IUs. Like best practicable control technology currently available (BPT), best available technology economically achievable (BAT), and best conventional pollutant control technology (BCT), local limits are technology-based, but their scope is more diverse and the development criteria used are different. These include:

- Allowable headworks loadings
- Toxicity reduction evaluation
- Technology in use
- Management practices

Categorical standards and local limits are complementary types of pretreatment standards. Categorical standards are developed to achieve uniform technology-based water pollution control nationwide for selected pollutants and industries. Local limits are intended to prevent site-specific POTW and environmental problems due to non-domestic discharges. The POTW will evaluate pollutants of concern from its permitted IUs and determine appropriate limits to prevent pass through, interference, and safety hazards at the POTW in compliance with its IPDES permit. DEQ recommends that the screening include the 15 pollutants of concern listed below at a minimum:

- Ammonia
- BOD_5
- Arsenic
- Cadmium
- Chromium
- Copper
- Cyanide
- Lead
- Mercury
- Molybdenum
- Nickel
- Selenium
- Silver
- TSS
- Zinc

Enforcement of a pretreatment program and its associated local limits is the responsibility of the POTW; however, pretreatment permits are typically enforced through compliance self-monitoring and sampling completed by the IU. Thus, it is important that the IUs know and understand the pretreatment standards that they must comply with. The POTWs will evaluate the industry's compliance monitoring and will perform periodic effluent monitoring to verify the industry's compliance.

3.1.4.4 Pretreatment Standards for Existing Sources (PSES)

PSES are designed to prevent the discharge of pollutants that cause pass through or interference at a POTW or causes contamination of a POTW's biosolids from IU discharges (Table 6). The categorical pretreatment standards for existing IU discharges are technology-based and are analogous to BAT for non-POTWs. The general pretreatment regulations, which set forth the framework for the implementation of national pretreatment standards, are at 40 CFR 403 (see CWA §307(b)).

3.1.4.5 Pretreatment Standards for New Sources (PSNS)

Like PSES, PSNS are designed to prevent the discharges of pollutants that cause pass through or interference at a POTW or cause contamination of a POTW's biosolids from IU discharges (Table 6). PSNS are issued in concurrence with New Source Performance Standards (NSPS).

New IU dischargers have the opportunity to incorporate the best available demonstrated technologies into their facilities at the time of construction. The same factors for NSPS are considered when assessing PSNS.

PSNS applies to non-conventional and toxic pollutants because POTWs are designed to treat conventional pollutants. However, the permit writer has the authority to establish categorical pretreatment standards for conventional pollutants as surrogates for toxic or non-conventional pollutants or to prevent interference.

Table 6. Summary of technology levels of control for indirect dischargers.

Pollutants Regulated	PSES	PSNS
Nonconventional pollutants	✓	✓
Toxic (Priority) pollutants	✓	✓

3.2 TBELs for Non-POTWs

TBELs are the treatment requirements set under CWA §301(b). These controls are promulgated by DEQ through the IPDES program for direct dischargers while indirect dischargers are controlled through DEQ-approved POTW pretreatment programs.

Under the CWA, the requirements for discharge controls on industries were to first meet limits that could be achieved through the use of BPT for wastewater treatment, and later by improved BAT. BCT was added by EPA in 1986 to evaluate conventional pollutant control processes using a two part cost-reasonableness test. BPT, BAT, and BCT are termed "technology-based" limits, in that the discharge limits were set on the basis of what the treatment technology could reasonably achieve, and not necessarily what was needed to protect the receiving water quality for its designated uses, such as aquatic life habitat.

When developing TBELs for industrial (non-POTW) facilities, the permit writer considers all applicable technology standards and requirements for all pollutants discharged and determines how much of a pollutant can be removed from the facility's effluent using available technology. TBELs represent the minimum level of industrial wastewater control that must be imposed in a discharge permit for all industrial facilities within a 40 CFR 405-471 category or subcategory. The type of technology-based effluent control required for each facility depends on whether the discharge is from a new or existing source and the type of pollutants discharged. There are cases where a single facility may be permitted for several different effluent limits. In these cases, a building block approach is used to develop the final TBEL.

Effluent guidelines can include numeric and narrative limits, including best management practices (BMPs), to control the discharge of pollutants from categories of point sources. The limits 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 limits 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 limits. Therefore, each facility has the discretion to select any technology ~~design~~ and process ~~changes~~ necessary to meet the performance-based discharge limits and standards specified by the effluent guidelines.

If no applicable ELGs exist for a discharge or pollutant, the permit writer must identify any needed site-specific TBELs on a case-by-case basis according to CWA §§301(b)(2) and 304(b). The site-specific TBELs reflect the permit writer's BPJ, taking into account the same factors EPA would use in establishing a national effluent guideline but applying them to the permit circumstances. The permit writer will identify if state laws or regulations might require more stringent performance standards than those required by federal regulations.

3.2.1 Effluent Guidelines and the Statutory Foundation

For dischargers other than POTWs, TBELs are based on BPT, BCT, BAT, or NSPS. For industrial discharges to a POTW the discharger must adhere to TBELs established for PSES, or if the facility is new, then they must comply with the PSNS. Section 3.1.4 includes additional information related to the standards required for IU discharges into a POTW with an approved pretreatment program. The performance standard required for each discharger is evaluated based on its current status as a new source, existing source, or new discharger (Figure 4) and the types of pollutants regulated (Table 7).

Table 7. Summary of technology levels of control for direct non-POTW dischargers.

Pollutants Regulated	BPT	BCT	BAT	NSPS
Conventional pollutants	✓	✓		✓
Nonconventional pollutants	✓		✓	✓
Toxic (priority) pollutants	✓		✓	✓

Conventional pollutants include BOD_5, TSS, pH, *E. coli*, and oil and grease. EPA has identified 65 pollutants and classes of pollutants as *toxic pollutants*, which can be found at the link below. All other pollutants are considered *nonconventional*.

https://www.epa.gov/eg/toxic-and-priority-pollutants-under-clean-water-act

3.2.1.1 Best Practicable Control Technology Currently Available (BPT)

BPT is the first type of technology-based control for direct dischargers and applies to all pollutants. When applying BPT to effluent limits, the following considerations must be made:

- The total cost of applying the control technology in relation to the benefits of the effluent reduction
- Age of the equipment and facilities
- Processes employed by the industry and any required process changes
- Engineering aspects of the control technologies
- Non-water quality environmental impacts, including energy requirements

BPT effluent limits have traditionally been based on the average of the best performance of well-operated facilities within 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 permit writer determines that the technology can be practically applied.

The economic reasonableness of BPTs must be evaluated prior to applying them to an IPDES permit; however, there is currently no precisely-defined test to determine economic reasonableness and must be considered from industry to industry.

Limits for industrial facilities are stated in the 40 CFR 405-471 subcategories, and these limits can take numerous forms. Most commonly, tables for each technology-based requirement will explicitly state the 1-day maximum and 30-day average values for each pollutant controlled under that subcategory (Table 8). In other cases, narrative requirements may be included, or a technology-based requirement may be excluded completely (noted as [Reserved] in the subcategory). Categories and subcategories are explained in further detail in Section 3.2.2.2.

Table 8. Example of BPT limits from 40 CFR 417.42 (glycerine concentration).

Pollutant or Pollutant Property	BPT Limits	
	1-Day Maximum	Average of Daily Values (30 Consecutive Days)
	English units (pounds per 1,000 lb of anhydrous product)	
BOD_5	4.50	1.50
COD	13.50	4.50
TSS	0.60	0.20
Oil and grease	0.30	0.10
pH	6.0–9.0	6.0–9.0

3.2.1.2 Best Conventional Pollutant Control Technology (BCT)

BCT is the second type of technology-based control and applies to conventional pollutants only. The control of conventional pollutants under BCT is always at least as stringent as under BPT. The following factors are considered when evaluating the applicability of BCT:

- Age of the equipment and facilities
- Processes employed by the industry and any required process changes
- Engineering aspects of the control technologies
- Non-water quality environmental impacts, including energy requirements

In addition to using these factors, BCT consideration uses a two part economic reasonableness test, described in 40 CFR 125.3(d)(2)(i) and (ii). Consistent with CWA §304(b)(4)(B), the permit writer will consider:

- The reasonableness of the relationship between the costs of attaining a reduction in effluent and the effluent reduction benefits derived.
- The comparison of the cost and level of reduction of such pollutants from the discharge from publicly owned treatment works (POTW) to the cost and level of reduction of such pollutants from a class or category of industrial sources.

This test compares the economic burden of an industrial user removing conventional pollutants beyond the limits set forth in BPT to a POTW's economic burden of removing the same pollutants beyond secondary treatment. Additional information about EPA's methodology for developing BCT limits is available in 51 FR 24974:
https://www3.epa.gov/npdes/pubs/fr_bct_1986.pdf

3.2.1.3 Best Available Technology Economically Achievable (BAT)

Limits for the direct discharge of non-conventional and toxic pollutants are promulgated using BAT. BAT is defined on the basis of the performance associated with the best control and treatment measures that facilities in an industrial category are capable of achieving. Factors to consider when assessing BAT include:

- The total cost of applying the control technology in relation to the benefits of the effluent reduction
- Age of the equipment and facilities
- Processes employed by the industry and any required process changes
- Non-water quality environmental impacts, including energy requirements

Unlike the cost analysis in BPT, BAT does not require the permit writer to balance the cost of implementation against the pollution reduction benefit. BAT may be based on process changes or internal controls, even when those technologies are not common industry practice.

3.2.1.4 New Source Performance Standards (NSPS)

NSPS, like BPT, applies to direct dischargers for all pollutants. NSPS reflect effluent reductions that are achievable based on “best available demonstrated control technology.” New sources have the opportunity to install the best and most efficient production processes and wastewater treatment technologies. NSPS should represent the most stringent controls attainable through the application of the best available demonstrated control technology for all pollutants. Factors to consider when assessing NSPS include:

- The total cost of applying the control technology in relation to the benefits of the effluent reduction
- Non-water quality environmental impacts, including energy requirements
- Other factors as DEQ deems appropriate

3.2.2 Apply Effluent Guidelines

Effluent guidelines are implemented and enforced through the IPDES permit for each industrial user. Direct dischargers are regulated by permits that specify limits using BPT, BAT, BCT, and NSPS. An overview of the process a permit writer will follow to determine applicable effluent guidelines and calculate final effluent limits for an industrial user is presented in Figure 5.

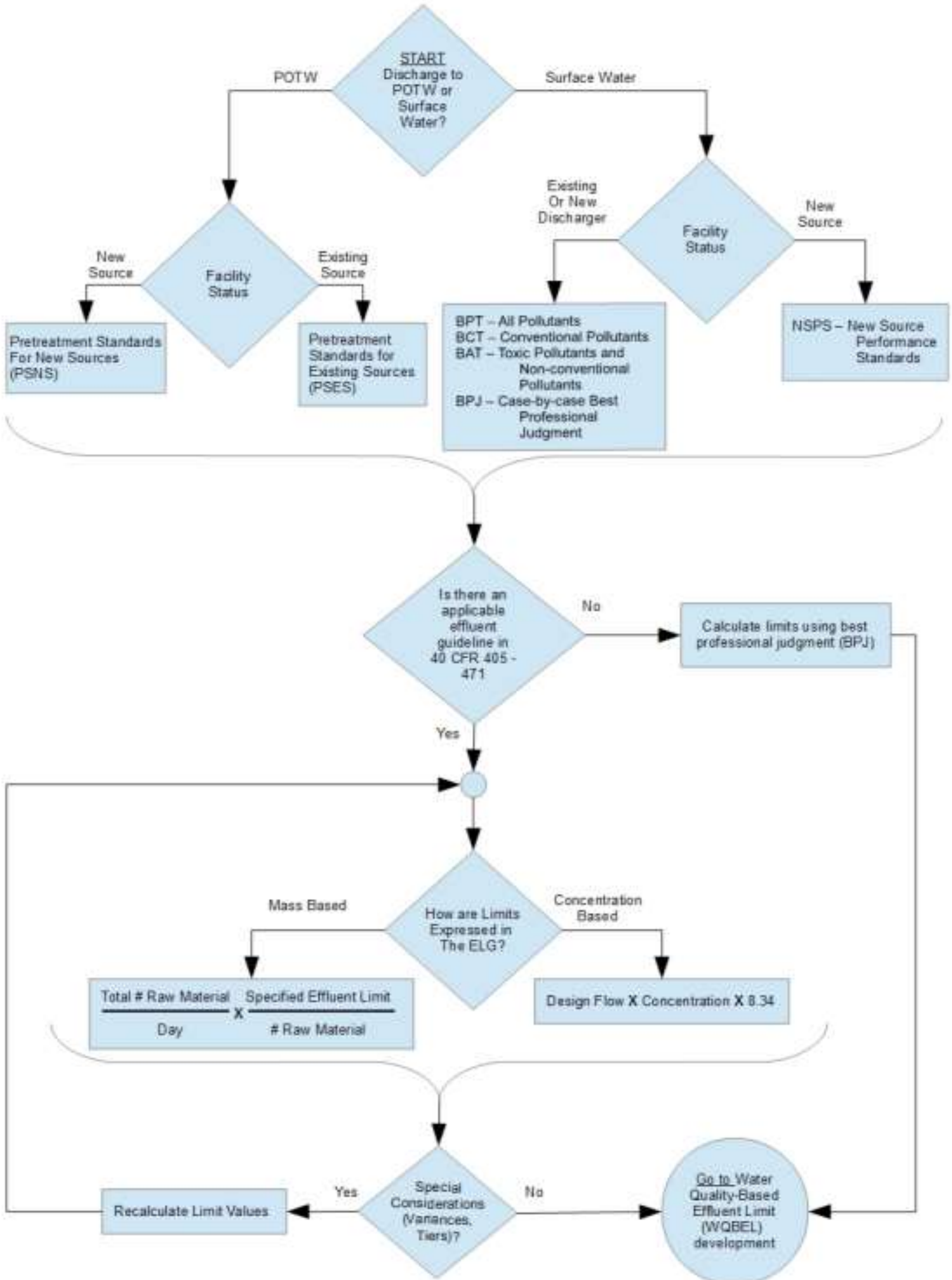

Figure 5. Overview of TBELs calculation for Non-POTW (Industrial) dischargers.

3.2.2.1 Learn about the Industrial Discharger

Facility-specific information is required to properly identify applicable effluent guidelines and derive TBELs. The following information, at a minimum, is necessary:

- 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
- 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 (~~DMRs~~)~~, site visits, site inspections (such as compliance evaluation inspections for an existing permit), and other information submitted by the facility.

3.2.2.2 Identify the Applicable Effluent Guideline Categories

Existing effluent guideline regulations are organized by EPA into industry categories and are found in 40 CFR 405-471 (Table 9). These are further broken down into subcategories. When determining subcategories, EPA considers a number of different factors, including manufacturing products and processes, raw materials used, wastewater characteristics, facility size, geographic location, age of the facility and equipment, and wastewater treatability. The results are a series of subcategories that cover certain types of industrial users and specify the effluent limits applicable to that industry's pollutants.

Table 9. Existing point source categories.

Industry Category	40 CFR Part	Industry Category	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

Industry Category	40 CFR Part	Industry Category	40 CFR Part
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[a]	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 Cleansing	442
Leather Tanning and Finishing	425	Waste Combustors	444

a. This category contains only categorical pretreatment standards and no effluent guidelines for direct dischargers

Identifying the applicable effluent guidelines for a facility is dependent upon the user providing DEQ as much information as possible about its operations. DEQ will additionally use the following sources of information in determining the appropriate 40 CFR 405-471 category and subcategory for an industrial user:

- **CFR titles and applicability section of the effluent guidelines**. The first step is to cross check the current information about the facility against Table 9. The category titles may indicate to which category the facility belongs. The General Provisions section under each category includes an applicability section that describes the types of industrial users covered under the category.
- **North American Industry Classification System (NAICS) and Standard Industrial Classification (SIC).** If finding the correct category for the industrial user using the titles in Table 9 is unsuccessful, the current NAICS or former SIC codes could be helpful in determining the appropriate 400 series category. NAICS and SIC codes are federal industrial classifications by activity. The NAICS and/or SIC code should be available in the IPDES permit or permit application.

NAICS Search: *https://www.naics.com/search/*

SIC Search: *https://www.osha.gov/pls/imis/sicsearch.html*

For example, a facility reports a SIC code of 3331 in its permit application. The search results on the OSHA website returns "Industry Group 333: Primary Smelting and Refining of Nonferrous Metals." This corresponds to 40 CFR 421 for Nonferrous Metals Manufacturing.

3.2.2.3 Identify the Applicable Effluent Guideline Subcategories

Regulation of an industrial category using subcategories allows each subcategory to have a uniform set of requirements that takes 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.

Subcategories cover a wide range of industrial activities. In some cases, a facility may fall under multiple subcategories, each with different effluent limits. Each subcategory contains an applicability section that provides a detailed explanation of the types of facilities and processes covered by the subcategory, which DEQ will carefully review to ensure properly derived TBELs. DEQ will notify each user of their coverage under 40 CFR 405-471 categories and subcategories as applicable.

3.2.2.4 Determine whether Existing or New Source Standards Apply

The type of control technology selected for each facility depends, in part, on whether the facility is a new or existing discharger or source. Table 10 defines the control technology that applies to each type of discharger (see also Figure 5). New and existing sources and new dischargers are defined in IDAPA 58.01.25.010. An *existing discharger* is one that has previously or is currently permitted to discharge pollutants, or did not previously require authorization to discharge.

Table 10. Technology levels of control for new and existing dischargers.

Pollutants Regulated	BPT	BCT	BAT	NSPS
Existing direct discharger	✓	✓	✓	
New direct discharger				✓

A *new discharger is* any building, structure, facility, or installation from which there is or may be a discharge of pollutants that did not commence the discharge of pollutants at a particular site prior to August 13, 1979, which is not a new source, and which never received a finally effective NPDES or IPDES permit.

Additional criteria for determining whether a discharge is a new source are defined in IDAPA 58.01.25.120:

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

Some 40 CFR 405-471 categories include additional criteria for making new source determinations.

Note that new dischargers are required to meet the requirements of their applicable technology-based guidelines *before* they begin discharging. This is because the facility has the opportunity to install the best and newest technology prior to commencing operations.

The most stringent level of control for each pollutant as specified in the subcategory for the facility will be used to derive the facility's TBELs.

3.2.2.5 Calculate TBELs from the Effluent Guidelines

IDAPA 58.01.25.303.06.a stipulates that all pollutants limited in permits must have limits, 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 limits.
- When applicable standards or limits are expressed in terms of other units of measure (e.g. concentration [mg/L]).
- If in establishing technology-based permit limits on a case-by-case basis, limits 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 limit (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 limits are expressed in the applicable effluent guideline. Generally, effluent guidelines include both maximum daily and monthly average limits for most pollutants. Though the effluent guidelines use different terms for monthly effluent limits (e.g., monthly average, maximum for monthly average, average of daily values for 30 consecutive days), the requirements are expressed in IPDES permits as average monthly limits as defined in IDAPA 58.01.25.010.06.

When calculating numeric limits from effluent guidelines, the permit writer will include all pollutants regulated by an effluent guideline and will include both maximum daily and average monthly effluent limits expressed as mass limits unless the guideline allows or requires concentration limits.

3.2.2.5.1 Calculating Mass-Based TBELs from Production-Normalized Effluent Guidelines

Production-normalized effluent guidelines are established using the past 3 to 5 years of facility data. The production rate used in the production-normalized TBEL calculation should be representative of the actual production likely to prevail during the next term of the permit and should account for any planned changes at the facility, such as an increase or decrease in production.

Consider the following example:

A facility that processes raw milk into cheese has applied for a permit. The permit writer has determined that the facility falls under 40 CFR 405 – Dairy Products Processing, Subpart F – Natural and Processed Cheese. The facility processes approximately 3,800,000 lbs of raw milk per day and is subject to BPT controls based on information from the subcategory. Calculate the

BPT Average Monthly Limits (AMLs) for BOD_5, TSS, and pH using Table 11 and the following example equations (Equation 4–Equation 6).

Table 11. BPT limits for 40 CFR 405 Subpart F.[a]

Effluent Characteristic	Effluent Limits: Maximum for any 1 day	Effluent Limits: Average of Daily Values for 30-Consecutive Days shall not exceed the values below:
	English units (pounds per 100 lb of BOD_5 input) except pH	
BOD5	0.073	0.029
TSS	0.109	0.044
pH	6.0-9.0	6.0-9.0

a. For plants processing more than 100,000 lb/day of milk equivalent (more than 10,390 lb/day of BOD*5* input).

$$BOD_5\ Conversion\ Factor = \frac{10{,}390\ \frac{lb}{day}\ BOD_5}{100{,}000\ \frac{lb}{day}\ raw\ material\ equivalent}$$

Equation 4. BOD_5 conversion factor.

$$Production\ Rate \times BOD_5\ Conversion\ Factor = Milk\ to\ BOD_5\ Equivalent$$

Equation 5. Milk to BOD_5 equivalent.

Convert Milk to BOD_5: $\frac{3{,}800{,}000\ lb\ raw\ milk}{day} \times \frac{\frac{10{,}390\ lb\ BOD_5}{day}}{\frac{100{,}000\ lb\ raw\ milk}{day}} = 394{,}820\ \frac{lb\ BOD_5}{day}$

$$Milk\ to\ BOD_5\ Equivalent \times Effluent\ Limit = lb/day$$

Equation 6. Final calculation for BOD_5 and TSS.

BOD_5: $\frac{394{,}820\ lb\ BOD_5}{day} \times \frac{0.029\ lb}{100\ lb\ BOD_5} = 110\ lb/day$

TSS: $\frac{394{,}820\ lb\ BOD_5}{day} \times \frac{0.044\ lb}{100\ lb\ BOD_5} = 170\ lb/day$

pH: Within the range of 6.0 to 9.0 standard units

3.2.2.5.2 Calculating Mass-Based TBELs from Flow-Normalized Effluent Guidelines

The process for calculating mass-based TBELs from flow-normalized effluent guidelines 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 will 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 (not the design flow rate). Use of design flow rates in these calculations result in increasingly relaxed discharge requirements for facilities whose average daily flow is well below design flow rate. The permit writer may use the past 3 to 5 years of facility data to assist in developing an appropriate estimate, but should account for planned changes over the next permit term. For example, the permit writer may use the highest average daily flow rate from the average daily flows of the last 3 to 5 years of facility data.

The example and equations presented in Table 12 and Equation 7 assess an organic chemical processing facility that must comply with the effluent guidelines in 40 CFR 414, Organic Chemicals, Plastics, and Synthetic Fibers. Assume that a reasonable estimate of the production flow is 16,000 gpd, based on the past three years of production history, and the facility does not anticipate any significant change from the flow rate over the next five years.

Table 12. BPT Limits for 40 CFR 414, Subpart G (bulk organic chemicals).

Effluent Characteristic	BPT Effluent Limits	
	Maximum for any 1 day	Maximum for monthly average
	All units except pH are milligrams per liter (mg/L)	
BOD_5	92	34
TSS	159	49
pH	6.0–9.0	6.0–9.0

$$\textit{Gallons per day} \times \frac{10^{-6} mgd}{gpd} = \textit{Flow Conversion to mgd}$$

Equation 7. Conversion of gallons per day (gpd) to million gallons per day (mgd).

Flow conversion: $$16{,}000\ gpd \times \frac{10^{-6} mgd}{gpd} = 0.016\ mgd$$

Maximum Daily Limit (using Equation 2):

BOD_5: $$0.016\ mgd \times 92\ \frac{mg}{L} \times 8.34 \frac{lb \times L}{mg \times MG} = 12\ lb/day$$

TSS: $$0.016\ mgd \times 159\ \frac{mg}{L} \times 8.34 \frac{lb \times L}{mg \times MG} = 21.2\ lb/day$$

pH: Within the range of 6.0 to 9.0 standard units

Average Monthly Limit:

BOD_5: $$0.016\ mgd \times 34\ \frac{mg}{L} \times 8.34 \frac{lb \times L}{mg \times MG} = 4.5\ lb/day$$

TSS: $$0.016\ mgd \times 49\ \frac{mg}{L} \times 8.34 \frac{lb \times L}{mg \times MG} = 6.5\ lb/day$$

pH: Within the range of 6.0 to 9.0 standard units

3.2.2.5.3 Calculating Mass-Based TBELs from Concentration-based Effluent Guidelines

In some cases, the permit writer will develop mass-based TBELs for facilities with concentration-based effluent guidelines (e.g., if a facility does not have adequate water conservation practices). Mass-based permit effluent limits 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 limits 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.

~~When calculating mass-based effluent limits, the permit writer will use the conversion factor of 8.34 and document this in the fact sheet.~~

Consider the example and equations presented in Table 13:

A facility covered under 40 CFR 413, Subpart D (Anodizing) is subject to PSES limitations and discharges 8,000 gpd.

What is the mass-based calculation for the facility's lead effluent?

Table 13. PSES limitations for anodizing facilities discharging less than 38,000 per day.

Pollutant or Pollutant Property	Maximum for any 1 day	Average of Daily Values for 4 Consecutive Monitoring days shall not exceed
CN, A	5.0	2.7
Pb	0.6	0.4
Cd	1.2	0.7

Flow conversion (using Equation 7): $8{,}000\ gpd \times \frac{10^{-6} MGD}{gpd} = 0.008\ mgd$

Maximum Daily Limit for lead (using Equation 2): $0.6\ \left(\frac{mg}{L}\right) \times 0.008\ (mgd) \times 8.34 = 0.04\ \frac{lb}{day}$

3.2.2.5.4 Supplementing Mass-Based TBELS with Concentration Limits

Even where effluent guidelines require mass-based TBEL calculations, the permit writer may determine that it is beneficial to include concentration-based limits to supplement the mass-based limits. Where limits are expressed in more than one unit, the facility must comply with both. Expressing limits in terms of both concentration and mass encourages the proper operation of a treatment facility at all times.

Supplementing mass-based limits with concentration-based limits may be especially appropriate where the requirements in the effluent guidelines are flow-normalized. This helps the permit writer account for changes in a facility's discharge during low flow periods while encouraging persistent treatment efficiency throughout the discharge season.

3.2.2.5.5 Incorporating Narrative Requirements from Effluent Guidelines

In some cases, DEQ may include narrative effluent guideline controls, which EPA has developed and included the 40 CFR 405-471 subcategories. When numeric effluent limits are infeasible, IDAPA 58.01.25.302.13 authorizes DEQ to include BMPs in IPDES permits to control or abate the discharge of pollutants. In some cases, *only* narrative guidelines will be provided in the applicable subcategory. For example, the effluent guidelines for CAAP facilities (40 CFR 451) consist of narrative requirements implemented through BMPs. Another example, related to monitoring and compliance rather than effluent limits, is found in the Metal Finishing (40 CFR 433) effluent guidelines. The guideline allows a facility to implement a toxic organic management plan along with a certifying statement in reports in lieu of routine total toxic organic monitoring. The plan assures the control authority that no toxics will be discharged by the permittee through good housekeeping and spill response measures. These narrative requirements may include BMPs, treatment practices, and monitoring, reporting, and compliance requirements.

3.2.2.6 Account for Overlapping or Multiple Effluent Guidelines Requirements

There are cases when a facility may be subject to overlapping or multiple effluent guidelines due to both new and existing sources at the facility, multiple products or services provided by the same facility, or a facility with processes subject to multiple subcategories. In such cases, the permit writer will examine the applicable effluent guidelines to ensure that (1) one guideline does not supersede another; and (2) the effluent guidelines are properly applied.

3.2.2.6.1 Superseding Effluent Guidelines

EPA minimizes the impact of overlapping effluent guidelines as much as possible during the development of effluent guidelines for point source categories by providing exclusions in the applicability sections. The permit writer will minimize the overlap of different effluent guidelines as much as possible by careful review of the facility's applicable subcategories.

In cases where a facility is subject to multiple subcategories, the limits from one may be more stringent than the other, requiring the more stringent to be selected. EPA has provided direction in the preamble of the ELG or provided specific direction in the affected ELG when a subcategory must comply with more than one ELG.

Consider the following example:

Several 400 series categories supersede the limits in 40 CFR 433, *Metal Finishing Point Source Category*. When one of the following industrial categories is effective, limits from 40 CFR 433 will not apply.

- Iron and steel (40 CFR 420)
- Nonferrous metal smelting and refining (40 CFR 421)
- ~~Coil coating (40 CFR 465)~~

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

3.2.2.6.2 Multiple Effluent Guidelines Requirements

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, each of the applicable effluent guidelines will be used individually to derive TBELs, which will then be combined. In applying multiple effluent guidelines, the permit writer will use measures of production or flow that are reasonable with respect to the operation of multiple processes at the same time and the overall production or flow of the facility for the next term of the permit.

Most commonly, wastewater streams regulated by effluent guidelines are combined during or before treatment. In such a case, the permit writer will combine the calculated 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 following example presents 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 (40 CFR 421, Subpart J). The same principles illustrated in this example would apply to a facility with processes subject to requirements from multiple subcategories or categories that are combined before or during treatment.

Example

A facility is subject to 40 CFR 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 (Table 14, Table 15, and Table 16).

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)

Given the information above, what is the technology-based effluent limit for lead at the facility?

BPT calculation for lead (40 CFR 421.102):

Table 14. BPT effluent limitations for tungstic acid rinse, 40 CFR 421, Subpart J (Primary Tungsten).

Pollutant or Pollutant Property	Maximum for any 1 day	Maximum for Monthly Average
	mg/kg (pounds per million pounds) of tungstic acid (as W) produced	
Lead	17.230	8.205
Zinc	59.900	25.030
Ammonia (as N)	5,469.000	2,404.00
Total suspended solids	1,682.000	800.000
pH	7.0–10.0	7.0–10.0

Table 15. BPT effluent limitations for acid leach wet air pollution control, 40 CFR 421, Subpart J (Primary Tungsten)

Pollutant or Pollutant Property	Maximum for any 1 day	Maximum for Monthly Average
	mg/kg (pounds per million pounds) of tungstic acid (as W) produced	
Lead	15.040	7.162
Zinc	52.280	21.840
Ammonia (as N)	4,773.000	2,098.000
Total suspended solids	1,468.000	698.300
pH	7.0–10.0	7.0–10.0

Table 16. BPT effluent limitations for alkali leach wash, 40 CFR 421, Subpart J (Primary Tungsten)

Pollutant or Pollutant Property	Maximum for any 1 day	Maximum for Monthly Average
	mg/kg (pounds per million pounds) of sodium tungstate (as W) produced	
Lead	0.000	0.000
Zinc	0.000	0.000
Ammonia (as N)	0.000	0.000
Total suspended solids	0.000	0.000
pH	([1])	([1])

BPT Maximum Daily Limit (Equation 8):

$$Production\ Rate\ \times Effluent\ Limit\ Guideline = lb/day$$

Equation 8. Building block approach maximum daily limit calculation

Tungstic acid rinse (daily maximum):
$(4.7\ million\ lbs\ per\ day) \times (17.230\ lbs\ per\ million\ lbs) = 80.981\ lbs/day$

Acid leach wet air pollution control (daily maximum):
$(4.7\ million\ lbs\ per\ day) \times (15.040\ lbs\ per\ million\ lbs) = 70.688\ lbs/day$

Alkali leach wash (daily maximum):
$(3.5\ million\ lbs\ per\ day) \times (0.000\ lbs\ per\ million\ lbs) = 0\ lbs/day$

Total allowable discharge (daily maximum):
$(80.981\ lbs/day) + (70.688\ lbs/day) + (0.000\ lbs/day)) = 151.669\ lbs/day$

The resulting daily maximum discharge under BPT is 151.669 lbs/day after accounting for significant digits.

Similarly, calculations using BPT maximum monthly average values (Table 14, Table 15, and Table 16) yields an average monthly maximum value of 72.225 (rounded from 72.2249) lbs/day.

BAT calculation for lead (40 CFR 421.103) (Table 17, Table 18, and Table 19):

Table 17. BAT effluent limitations for tungstic acid rinse, 40 CFR 421, Subpart J (Primary Tungsten).

Pollutant or Pollutant Property	Maximum for any 1 day	Maximum for Monthly Average
	mg/kg (pounds per million pounds) of tungstic acid (as W) produced	
Lead	11.490	5.333
Zinc	41.850	17.230
Ammonia (as N)	5,469.000	2,404.000

Table 18. BAT effluent limitations for acid leach wet air pollution control, 40 CFR 421, Subpart J (Primary Tungsten).

Pollutant or Pollutant Property	Maximum for any 1 day	Maximum for Monthly Average
	mg/kg (pounds per million pounds) of tungstic acid (as W) produced	
Lead	1.003	0.466
Zinc	3.653	1.504
Ammonia (as N)	477.400	209.900

Table 19. BAT effluent limitations for alkali leach wash, 40 CFR 21, Subpart J (Primary Tungsten).

Pollutant or Pollutant Property	Maximum for any 1 day	Maximum for Monthly Average
	mg/kg (pounds per million pounds) of sodium tungstate (as W) produced	
Lead	0.000	0.000
Zinc	0.000	0.000
Ammonia (as N)	0.000	0.000

BAT Maximum Daily Limit (using Equation 8):

Tungstic acid rinse:
$(4.7\ million\ lbs\ per\ day) \times (11.490\ lbs\ per\ million\ lbs) = 54.003\ lbs/day$

Acid leach wet air pollution control:
$(4.7\ million\ lbs\ per\ day) \times (1.003\ lbs\ per\ million\ lbs) = 4.714\ lbs/day$

Alkali leach wash:
$(3.5\ million\ lbs\ per\ day) \times (0.000\ lbs\ per\ million\ lbs) = 0\ lbs/day$

Total allowable discharge:
$(54.003\ lbs/day) + (4.714\ lbs/day) + (0.000\ lbs/day)) = 58.717\ lbs/day$

The resulting daily maximum discharge under BAT is ~~59~~ 58.717 lbs/day after accounting for significant digits.

Therefore, the technology-based maximum daily limit for lead at the facility is the more stringent BAT limit of 58.717 59lbs/day.

Similarly, calculations using BAT maximum monthly average values (Table 17, Table 18, and Table 19) yield an average monthly maximum value of 27.255 (rounded from 27.2553) lbs/day.

Compare the results and select the more stringent daily maximum and monthly average for inclusion in the permit.

The permit writer may apply the building block approach in other circumstances as well, such as:

- **Mixture of mass-based and concentration-based requirements:** The limits in effluent guidelines for some pollutants are mass-based, production-normalized limits in some subparts and concentration-based limits in other subparts. When all the wastewater streams go to the same treatment system, the permit writer will convert the concentration-based limits to mass-based limits. This will allow the permit writer to combine the results with the mass-based, production-normalized limits and apply the limit to the combined wastewater stream.
- **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 will establish a flow-weighted concentration-based limit as the TBEL for the combined wastewater streams. Alternatively, the permit writer may convert the concentration-based requirements to equivalent mass-based requirements using flow data and then combine the mass-based requirements into a single limit for the combined wastewater stream.
- **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 guideline requirements that regulate the pollutant. In such a case, the permit writer will use BPJ to establish a TBEL for the unregulated wastewater stream(s) 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, then the permit writer would use BPJ to apply the treatment standards for domestic wastewater and calculate BOD_5 limits for that wastewater stream. The secondary treatment standards would 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 limits 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 establish internal outfalls, as allowed under IDAPA 58.01.25.303.08.

3.2.2.7 Apply Additional Regulatory Considerations in Calculating TBELs

Several additional factors must be considered when deriving TBELs from effluent guidelines. Additional requirements consist of evaluating or accounting for the following:

- Expected significant increases or decreases in production during the permit term for tiered discharger limits.
- Internal outfalls.
- Request(s) for a variance from effluent guidelines.

The following sections provide an overview of these considerations.

3.2.2.7.1 Tiered Discharge Limits

If production rates are expected to change significantly during the life of the permit the use of tiered TBELs may be included in the permit, or a reopener clause may be included, depending upon the facility and/or the receiving water conditions. If tiered TBELs are incorporated into the permit they would apply to mass-based effluent limits and would become effective when production or flow (or some other measure of production) exceed a threshold value, such as during seasonal production variations. Generally, up to 20% fluctuation in production is considered to be within the range of normal variation, while increases or decreases higher than 20% could warrant consideration of tiered limits.

Consider the following example:

Over the previous 5 years, 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. 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 over the next 5 years. The effluent guideline requirements for Pollutant Z are 0.08 lbs/1,000 lbs for the average monthly limit and 0.14 lbs/1,000 lbs for the maximum daily limit.

What are the appropriate tiered effluent limits for Plant B?

Tier 1:

The first tier, or lower limit, would be based on a production rate of 40 tons per day. The limits would apply between March and August (Equation 9).

$$Production\ Rate \times 2{,}000\frac{lbs}{ton} \times Effluent\ Limit\ Guideline = lbs/day$$

Equation 9. Calculation for tiered limits.

Monthly average limit:

$$40\ \text{tons/day} \times 2{,}000\ \text{lbs/ton} \times 0.08\ \text{lbs/1,000 lbs} = 6.4\ \text{lbs/day}$$

Daily maximum limit:

$$40\ \text{tons/day} \times 2{,}000\ \text{lbs/ton} \times 0.14\ \text{lbs/1,000 lbs} = 11\ \text{lbs/day}$$

Tier 2:

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

Using Equation 9:

Monthly average limit:

$$280\ \text{tons/day}\ \times 2{,}000\ \text{lbs/ton} \times 0.08\ \text{lbs/1,000 lbs} = \text{~~45~~}50\ \text{lbs/day}$$

Daily maximum limit:

$$280\ \text{tons/day}\ \times 2{,}000\ \text{lbs/ton} \times 0.14\ \text{lbs/1,000 lbs} = 78\ \text{lbs/day}$$

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

The permit writer may also base thresholds for tiered limits 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 limits that go into effect when the facility reports reaching a production level specified in the permit. Alternatively, if the production increase changes the subcategory, or other considerations may need to be addressed, the permit writer may modify the permit as allowed in IDAPA 58.01.25.201.02.c.

The permit will detail thresholds and periods when each tier applies, measures of production, and special reporting requirements. Special reporting requirements may include the following:

- Facility notification to DEQ a specified number of business days before the month it expects to be operating at a higher level of production and the duration of this level of production.
- Facility reporting, in the DMR, the level of production and the limits and standards applicable to that level.

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

3.2.2.7.2 Internal Outfalls

IDAPA 58.01.25.303.08 authorizes DEQ to identify internal outfalls when effluent limits or standards at the point of discharge are impractical or infeasible. Limits on internal waste streams, frequency of and locations for monitoring, and analytical methods will be described in the fact sheet. Examples of circumstances include: when the final discharge point is inaccessible (impacted by receiving water flow or surcharge), the wastes at the point of discharge are so diluted as to make monitoring impracticable, or the interferences among pollutants at the outfall would make detection or analysis impracticable. Some effluent guidelines may require the use of internal outfalls unless the effluent limits are adjusted based on the dilution ratio of the process wastewater to the wastewater flow at the compliance point. Any internal outfall monitoring that might be required by the applicable effluent guidelines will be clearly identified in the final permit. Examples of effluent guidelines with required internal compliance points include the Metal Finishing effluent guidelines (40 CFR 433) and the Pulp, Paper, and Paperboard effluent guidelines (40 CFR 430).

3.2.2.7.3 Effluent Guidelines Variances, Waivers, and Intake Credits

The CWA and state regulations provide limited mechanisms for variances, waivers, and intake credits from requirements in effluent guidelines. An IPDES permit applicant must meet very specific data and application deadline requirements before a variance, waiver, or intake credit may be granted. These mechanisms provide a unique exception to particular requirements, and no expectation to receive a similar permit condition should be assumed by the permittee or applicant.

Table 20 explains the available variances, waivers, and intake credits from TBEL for non-POTW dischargers.

Table 20. Available variances, waivers, and intake credits for IPDES permits.

Request Type	Eligible	CWA	Regulation	Application Deadline[a]	Granting Authority[b]
Economic	Non-POTWs	301(c)	IDAPA 58.01.25.310 40 CFR 122.21(m)	Initial request to DEQ < 270 days after promulgation of effluent limit guideline. A completed request by close of the draft permit comment period.	EPA[c]
Nonconventional pollutant	Non-POTWs	301(g)	IDAPA 58.01.25.310 40 CFR 122.21(m)	Initial request to DEQ < 270 days after promulgation of effluent limit guideline. A completed request by close of the draft permit comment period.	EPA[c]
Fundamentally different factors (FDF)	Non-POTWs	301(n)	IDAPA 58.01.25.310 40 CFR 125.30–32	For BPT a request by the close of the public comment period. For BAT or BCT a request by no later than 180 days after an effluent limit guideline is published in the Federal Register.	EPA[c]
Thermal discharge	All	316(a)	IDAPA 58.01.25.310 40 CFR 125.70–73	With a permit application if based on an effluent guideline.	DEQ
Waivers	All	N/A	IDAPA 58.01.25.105 58.01.25.106 58.01.25.302.03	With a permit application.	DEQ
Intake credits	All	N/A	IDAPA 58.01.25.303.07	By close of the draft permit comment period.	DEQ

a. Permittees are advised to contact DEQ 1 year in advance if considering applying for a variance. The 180-day requirement to submit a complete application for a new permit or permit renewal may not be sufficient to also complete a variance and receive EPA approval. Dischargers must submit all requests to DEQ.
b. Any approved variance, waiver, or intake credit is effective for up to 5 years or the life of the IPDES permit. After 5 years or the permit expiration, the discharger must meet the standard or must reapply for the variance, waiver, or intake credit. In considering a reapplication, DEQ requires the discharger to demonstrate reasonable progress toward meeting the standard. DEQ's decisions may be appealed to the Board of Environmental Quality.
c. CWA §§301(c), 301(g), and 301(n) variances—If DEQ concurs with the variance request, the request must be forwarded with written concurrence to EPA for review and approval.

The options listed in Table 20 and the factors considered in a technical review are explained in the IPDES User's Guide, Volume 1, Section 8 (DEQ 2016).

3.2.2.8 Apply Additional Requirements in Effluent Guidelines

Industrial storm water, specific analytical methods for measuring compliance with TBELs, and documentation and recordkeeping requirements are additional areas which need evaluation and incorporation into permit provisions, if necessary.

Industrial storm water sometimes falls under regulations by effluent guidelines when there is an opportunity for unsheltered industrial operations to come into contact with and contaminate storm water. Examples of categories which fall under effluent guideline regulations are Concentrated Animal Feeding Operations (40 CFR 412), Fertilizer Manufacturing (40 CFR 418), Petroleum Refining (40 CFR 419), and Pulp, Paper, and Paperboard (40 CFR 430). Storm water that is commingled with process wastewater will require the adjustment of the effluent guidelines to account for overlapping or multiple effluent guideline requirements, discussed in section 3.2.2.6.

When more than one analytical method is available in 40 CFR 136 for analysis of a parameter, the permit writer may need to determine the appropriate ML necessary to maintain permit compliance using EPA's sufficiently sensitive test method (section 2.3.2). When permit conditions require specific analytical methods to determine compliance with TBELs, the permit will clearly state which analytical method to use for a particular pollutant(s).

Documentation and recordkeeping are mandatory components for permit compliance, and submission schedules will be included for each of the required plans (e.g., solvent management plans, BMP plans, and alternative monitoring requirements).

3.2.2.9 Document the Application of Effluent Guidelines in the Fact Sheet

The IPDES permit fact sheet will document the data and information used to determine applicable effluent guidelines, how the effluent limits were derived and the final permit effluent limits. The fact sheet will clearly explain all considerations of applicable TBELs and variance, waiver, and intake credit requests.

3.2.3 Case-by-Case TBELs for Industrial Dischargers

40 CFR 125.3 states that technology-based treatment requirements under the CWA §301(b) represent the minimum level of control that must be imposed in an IPDES 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.

3.2.3.1 Legal Authority to Establish Case-by-Case TBELs

Case-by-case TBELs are developed pursuant to CWA §402(a)(1) and IDAPA 58.01.25.302.03, which authorizes the permit writer 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 or water quality standards) or, before taking the necessary implementing actions related to those requirements, that the permit writer determines are necessary to carry out the provisions of the CWA. Further, 40 CFR 125.3(c)(3) states that technology based treatment requirements may be imposed through one of the following three methods:

1. Application of EPA-promulgated effluent limits developed under CWA 304 to dischargers by category or subcategory.
2. On a case-by-case basis under CWA 402, to the extent that EPA-promulgated effluent limits are inapplicable.
3. Through a combination of the methods in 1 and 2. ~~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.~~ When establishing case-by-case effluent limits using BPJ, the approach selected and how the limit upholds CWA and IPDES regulations will be clearly documented ~~cited~~ in the fact sheet.

3.2.3.2 Identify 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 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 IPDES 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).
- 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 will make sure that the pollutant of concern is not already controlled by the effluent guidelines and was not considered by EPA when they developed the effluent guidelines.

Generally, case-by-case limits 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).

EPA periodically reviews existing and develops new effluent guidelines. EPA's effluent guidelines planning support documents are located on EPA's Effluent Guidelines Plan Website <*https://www.epa.gov/eg/effluent-guidelines-plan* >.

3.2.3.3 Factors Considered when Developing Case-by-Case TBELs

The regulations at 40 CFR 125.3(c)(2) ~~require case-by-case effluent limits consider the following~~ establish the appropriate level of performance on a case-by-case basis considering:

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

An evaluation for case-by-case limits, conducted by the permit writer, will consider the factors specified in 40 CFR 125.3(d), based on BPT, BCT, and BAT. The most stringent technology level of control will be selected for each pollutant of concern and incorporated into the permit.

Technical criteria for BPT, BCT, and BAT:

- Age of equipment and facilities involved
- Process(es) employed
- Engineering aspects of the application of various types of control techniques
- Process changes
- Non-water quality environmental impact including energy requirements

Economic criteria:

- BPT – The total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application
- BCT – The reasonableness of the relationship between the costs of attaining a reduction in effluent and the derived effluent reduction benefits, and 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
- BAT – The cost of achieving such effluent reduction

~~For BPT requirements, the following will be assessed:~~

- ~~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, and~~
- ~~The total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application~~

~~For BCT requirements, the following will be assessed:~~

- ~~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 reasonableness of the relationship between the costs of attaining a reduction in effluent and the derived effluent reduction benefits, and~~

- ~~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, the following will be assessed:~~

- ~~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, and~~
- ~~The cost of achieving such effluent reduction~~

Example

Privately-owned treatment works treating domestic sewage

Problem: Private facility discharges to surface water. The facility is privately owned and does not qualify for POTW limits. Discharge contains pollutants (BOD_5, TSS, pH) from domestic sources that are equivalent to influent received in a small municipal wastewater treatment facility. There are no effluent guidelines for privately-owned treatment works treating domestic sewage.

Solution: Case-by-case assessment using BPJ identifies equivalence with POTW secondary treatment standards or performance requirements derived from submitted data (IDAPA 58.01.16.455.04). Establishing appropriate limits for BOD_5, TSS, and pH are done by evaluating the facility's performance level using technical and economic criteria found above for BPT and BCT. The BPJ analysis will reasonably defend the documentation through inclusion of statutory/regulatory citation, identification of which pollutants were assessed and by what TBEL, and how the technical/economic criteria influenced the final permit limit, if any.

As previously stated, technology-based controls in IPDES permits are performance-based measures. DEQ incorporates technology-based controls in IPDES permits that correspond to the application of an identified technology (including process changes) but does not require dischargers to install the identified technology. Therefore, DEQ leaves to each facility the discretion to select the technology design or process changes necessary to meet the TBELs specified in the IPDES permit.

The permit may also establish a monitoring-only requirement in the current IPDES permit to identify pollutants of concern and potential case-by-case limits for the subsequent IPDES permit renewal.

3.2.3.4 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. The following lists references that may be used to derive such limits.

Permit file information

- Current and previous IPDES application forms
- Previous ~~IPDES~~ permit and fact sheets

- DMRs
- Compliance inspection reports

Information from existing facilities and permits

- IPDES Individual and General Permits for other IPDES permits issued to facilities in the same region, or that include case-by-case limits for the same pollutants
- Toxicity reduction evaluations for selected industries
- Other media permit files (e.g., Resource Conservation and Recovery Act permit applications and Spill Prevention Countermeasure and Control plans)
- ICIS-NPDES data *https://www3.epa.gov/enviro/facts/pcs-icis/search.html*
- Literature (e.g., technical journals and books)

Effluent guidelines development and planning information

- EPA's Effluent Guidelines *https://www.epa.gov/eg*
- EPA's Effluent Guidelines Plan *https://www.epa.gov/eg/effluent-guidelines-plan*
- EPA's Effluent Guidelines Program Contacts *http://www.epa.gov/eg/forms/contact-us-about-effluent-guidelines*

Economics guidance

- Protocol and Workbook for Determining Economic Achievability for NPDES Permits BCT Cost Test Guidance

Guidance for BMP-based limitations

- Guidance Manual for Developing Best Management Practices (BMP)
- Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and BMPs (EPA 1993)
- National Menu of Best Management Practices (BMPs) for Stormwater *https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#edu*

3.2.3.5 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 [LTA]) and the variance (or coefficient of variation) and by assuming a particular statistical distribution (usually lognormal).

When developing a case-by-case limit, the permit writer will use an approach consistent with the statistical approach EPA has used to develop effluent guidelines in EPA's analysis for developing national standards but performed by the permit writer for a single facility. EPA's Technical Support Document (TSD) will be used to provide statistical approaches for setting maximum daily limit and AML at an appropriate performance level based on expected long-term average LTA performance. Specifically, the maximum daily limit could be calculated by multiplying the long-term average LTA 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 limit AML 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 consist 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 limits and that the detected values follow a lognormal distribution.For more details on EPA's use of statistical methods for developing effluent guidelines, refer to EPA's Effluent Guidelines website: *https://www.epa.gov/eg*.

3.2.3.6 Document Case-by-Case TBELs in the Fact Sheet

The development of case-by-case limits will be addressed in the IPDES permit fact sheet. The data and information used in developing effluent limits and how that information was applied will clearly state the rationale for concluding that there are:

- Applicable case-specific limits or
- No applicable effluent guidelines for the industrial wastewater or pollutant discharge.

The case-by-case using BPJ determination should be defensible and reasonable. The reasonableness is demonstrated by documentation that:

- Identifies statutory and regulatory citations
- Establishes that case-by-case limits are appropriate and why effluent guidelines do not apply
- Identifies pollutant(s) for BPJ analysis and the performance level required by the CWA (i.e. BPT, BCT, or BAT)
- Lists each of the applicable criteria from 40 CFR125.3 and provide an explanation of how each was considered in the BPJ analysis

The information in the fact sheet will clearly state the rationale for provide a defensible description of how the BPJ limits comply with CWA and IPDES regulations.

4 Determining Water Quality-Based Effluent Limits (WQBELs)

WQBELs help meet the CWA objective of restoring and maintaining the chemical, physical, and biological integrity of the state's water and provide for the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water (fishable/swimmable goal). When drafting an IPDES permit, a permit writer must consider the impact of the proposed discharge on the quality of the receiving water. Water quality goals for a water body are defined by Idaho WQS, which support the CWA. When analyzing the effect of a discharge on the receiving water, a permit writer may determine that TBELs alone will not prevent violations of applicable WQS. In such cases, 40 CFR 125.3(a) requires development of more stringent WQBELs.

4.1 Characterize the Effluent

The permit writer uses information from the permit application to identify pollutants that may be discharged by the facility and impact the receiving water. The permit writer then determines whether WQBELs are required, and if so, calculate WQBELs.

4.1.1 Identify Pollutants of Concern in the Effluent

There are several sources of information and methods of identifying pollutants of concern for WQBEL development (i.e. site visit, communication with facility staff, review monitoring history). Pollutants of concern are any pollutants or pollutant parameters that the permit writer has reason to believe are or may be discharged by the facility or could affect or alter the physical, chemical, or biological condition of the receiving water. These pollutants may not necessarily receive an effluent limit in an IPDES permit but do go through a RPA, described in Section XX . Pollutants of concern are not limited to those parameters covered by technology standards. Determining which pollutants are pollutants of concern is an iterative process; additional pollutants of concern may be identified during a review of applicable WQS and receiving water characterization. The following subsections identify the categories of pollutants of concern for WQBEL development.

4.1.1.1 Pollutants with Applicable TBELs

One category of pollutants of concern includes those pollutants for which the permit writer has developed TBELs based on national technology standards or on a case-by-case basis using BPJ. By developing TBELs for a pollutant, the permit writer has already determined that there will be some type of final limit for that pollutant in the permit and must then determine whether more stringent limits than the applicable TBELs are needed to prevent an excursion above WQS in the receiving water. A permit writer can determine whether the TBELs are sufficiently protective by completing a RPA.

4.1.1.2 Pollutants with a TMDL WLA

Pollutants of concern include those pollutants for which a TMDL WLA has been assigned to the discharge. A TMDL WLA, as applied here, refers to the portion of the receiving water body loading capacity that is allocated to one of its existing or future pollutant point sources. The TMDL WLA could be allocated through an EPA-approved TMDL or an EPA or state watershed loading analysis. The regulations at IDAPA 58.01.25.302.06.a.vii.2 require that permits include effluent limits developed consistent with the assumptions and requirements of any TMDL WLA.

Under CWA section 303(d), states are required to develop lists of impaired waters. Impaired waters are those that do not meet the WQS set for them, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that those jurisdictions establish priority rankings for water on their CWA section 303(d) list and develop TMDLs for those waters.

A TMDL is a calculation of the maximum amount of a single pollutant that a water body can receive and still meet water quality standards. The TMDL may allocate an amount of the pollutant to the various pollutant sources discharging to the water body. These portions of the TMDL assigned to point sources are WLAs, and the portions assigned to nonpoint sources and background concentrations of the pollutant are called load allocations (LAs). The calculation must include a margin of safety to ensure that the water body can be used for the purposes designated in the WQS, to provide for the uncertainty in predicting how well pollutant reduction will result in meeting WQS, and to account for seasonal variations. A TMDL might also include a reserve capacity to accommodate expanded or new discharges in the future.

4.1.1.3 Pollutants Identified as Needing WQBELs in the Previous Permit

Another category of pollutants of concern includes those pollutants that were identified as needing WQBELs in the discharger's previous permit. Permit writers must determine whether the conditions leading to a decision to include WQBELs for the pollutant in the previous permit continue to apply. Where those conditions no longer apply, the permit writer would need to complete an anti-backsliding analysis to determine whether to make the WQBELs less stringent than the previous permit. Section XX illustrates how anti-backsliding requirements are applied to the permit development process.

4.1.1.4 Pollutants Identified as Present in the Effluent Through Monitoring

Pollutants of concern also include any pollutants identified as present in the effluent through effluent monitoring. Effluent monitoring data are reported in the discharger's IPDES permit application, DMRs, annual reports, and special studies. Whole effluent toxicity (WET) testing and expanded effluent monitoring may be required of POTWs. Any parameters that are detected through WET testing or expanded effluent monitoring are pollutants of concern. Additionally, DEQ may collect data through compliance inspection monitoring or other special studies. Permit writers can match information on which pollutants are present in the effluent to the applicable WQS to identify parameters that are candidates for WQBELs.

4.1.1.5 Pollutants Otherwise Expected to be Present in the Discharge

Another category of concern includes those pollutants that are not in one of the other categories but are otherwise expected to be present in the discharge. There might be pollutants for which neither the discharger nor DEQ have monitoring data, but because of raw materials stored or used, products or by-products of the facility operation, or available data on similar facilities, the permit writer has a strong basis for expecting the pollutant to be present in the discharge. The permit writer should require the discharger to generate effluent monitoring data, or base the determination for WQBELS on other information, such as effluent characteristics of a similar discharge. Calculating WQBELs without data is discussed in further detail in Section XX.

4.1.2 Identify Effluent Critical Conditions

Identifying the right effluent critical conditions is important for appropriately applying a water quality model to assess the need for WQBELs and to calculate WQBELs. The process to determine the appropriate water quality model and the variables associated with the calculation are presented in Section XX. The effluent critical conditions, which will be used in the calculation, are summarized in Sections 4.1.2.1 and 4.1.2.2. Receiving water critical conditions are presented in Section 4.2.

4.1.2.1 Effluent Flow

Effluent flow is a critical design condition used when modeling the discharge's impact on receiving water. A permit writer can obtain effluent flow data from DMRs or a permit application. IDAPA 58.01.02 specifies which flow measurement(s) to use as the critical effluent flow value(s) in various water quality-based permitting calculations (e.g., the maximum daily flow reported on the permit application or the maximum of the monthly average flows from DMRs for the past 3 years). The calculations will use either the production flow or the design flow rate.

4.1.2.2 Effluent Pollutant Concentration

Permit writers can determine the pollutant of concern's critical effluent concentration by gathering effluent data representative of the discharge. In most cases, permit writers have a limited effluent data set and no definitive way to determine that the data actually include the pollutant of concern's maximum potential effluent concentration. EPA's TSD provides guidance on how to statistically characterize pollutant concentrations from a limited data set and appropriately account for variability.

From studies of effluent data from numerous facilities, EPA determined that daily pollutant measurements follow a lognormal distribution. The TSD procedures allow permit writers to project a critical effluent concentration from a limited dataset using statistical procedures based on the characteristics of the lognormal distribution (Section 2.6.2). These procedures use the number of effluent data points for the measured concentration of the pollutant and CV of the data set, which is a measure of the variability of data around the average, to predict the critical pollutant concentration in the effluent.

The TSD recommends a CV of 0.6 for data sets with fewer than 10 data points. Data sets of more than 10 data points provide a sufficient level of certainty to calculate a standard deviation and mean with confidence. The resulting CV may be different from the 0.6 default recommended in the TSD (Equation 10).

$$CV = \frac{Standard\ Deviation}{Mean}$$

Equation 10. CV calculation.

4.2 Characterize Receiving Water Critical Conditions

After identifying pollutants of concern in effluent critical conditions, a permit writer should characterize the receiving water. The permit writer uses the information from those characterizations and the WQS in Section 4.3 to determine whether WQBELs are required (Section XX) and, if so, to calculate WQBELs (Section XX).

4.2.1 Receiving Water Upstream Flow

For rivers and streams, an important critical condition is the stream flow upstream of the discharge. The applicable critical flow statistic is specified in the WQS and reflects the duration and frequency components of the water quality criterion that is being addressed. WQBELs and mixing zones for toxic substances are based on the receiving water low flow conditions identified in Table 21.

Table 21. Receiving water low flow design conditions for reasonable potential analysis and effluent limit development.

Criteria Type	Use Designation	Flow Statistic	Flow Description
Acute	Aquatic Life	1Q10	Lowest one-day flow with an average recurrence frequency of once in 10 years
		1B3	Biologically based flow indicating an allowable exceedance once every 3 years
Chronic	Aquatic Life	7Q10	Lowest seven consecutive day low flow with an average recurrence frequency of once in 10 years
		4B3	Biologically based flow indicating an allowable exceedance for 4 consecutive days once every 3 years
Human Health	Contact Recreation Domestic Water Supply	Harmonic Mean Flow	Long term mean flow value calculated by dividing the number of daily flows analyzed by the sum of the reciprocals of those daily flows

The permit writer might examine hydrologic stream flow data from the U.S. Geological Survey (USGS) or other credible flow measurements to determine the critical flow at a point upstream of the discharge. The permit writer might also account for any additional sources of flow or diversions between the point where a critical low flow has been calculated and the point of discharge. EPA also has developed a biologically based flow method that directly uses the durations and frequencies specified in the water quality criteria (1B3 and 4B3).

For most pollutants and criteria, the critical flow in rivers and streams is some measure of the low flow of that river or stream; however, the critical condition could be different (for example, a high flow, where wet weather sources are a major problem). If a discharge is controlled so that it does not cause water quality criteria to be exceeded in the receiving water at the critical flow condition, the discharge controls should be protective and ensure that water quality criteria, and thus designated uses, are attained under all receiving water flow conditions.

The water body will be considered non-flowing when the receiving water body has a mean detention time longer than 15 days. DEQ will assess non-flowing water bodies on a case-by-case basis. Volume 2 of the User's Guide provides additional information on situations where the receiving water body is designated non-flowing.

4.2.2 Receiving Water Upstream Pollutant Concentration

DEQ also needs the critical upstream concentration in the receiving water to ensure that any pollutant limits derived protect the beneficial uses and support the antidegradation policy and implementation. When available, ambient data provide the most reliable receiving water background pollutant characterization. When data are not available, DEQ may include ambient monitoring requirements in the permit conditions, along with a reopener clause. When data are not available but are being collected, ambient monitoring requirements and the availability of mixing would be determined on a case-by-case basis dependent on the potential risk to beneficial uses (sensitivity of uses and quality of effluent).

4.2.3 Other Receiving Water Characteristics

For water bodies other than free-flowing rivers and streams, there might be critical environmental conditions that apply rather than flow (e.g., water level fluctuation, temperature). In addition, depending on the pollutant of concern, the effects of biological activity and reaction chemistry might be important in assessing the impact of a discharge on the receiving water. In such situations, additional critical receiving water conditions consistent with WQS are used in a water quality model including conditions such as pH, temperature, hardness, or reaction rates, and the presence or absence of certain fish species or life stages of aquatic organisms. Section XX provides further discussion of how critical conditions are applied in a water quality model to determine the need for and calculate WQBELs.

4.3 Determine Applicable Water Quality Standards (WQS)

The CWA requires states to develop and, from time to time, revise WQS. The Idaho Water Quality Standards Program is a joint effort between DEQ and EPA. EPA develops recommended criteria, regulations, policies, and guidance consistent with the requirements of the CWA. DEQ may adopt and enforce EPA's recommendations directly or modify them to fit state-specific conditions to protect beneficial uses. EPA has authority to review, and approve or disapprove state standards, and to promulgate federal water quality rules if it finds the state is not meeting the requirements of the CWA.

WQS define water quality goals and pollutant limits that support propagation of fish, shellfish and wildlife, and recreation in and on the water. In establishing standards, DEQ must consider the use and value of waters for public water supplies, propagation of fish and wildlife, recreation, agriculture, industry, and navigation.

DEQ's WQS are published in IDAPA 58.01.02. The WQS designate the uses that are protected for each water body or segment (e.g., Assessment Unit; DEQ 2015). These standards are the basis for restrictions placed on the discharge of wastewater and on human activities that may adversely affect public health and water quality. When developing an IPDES permit, the permit writer must identify and use Idaho's WQS applicable to the receiving water body.

WQS are comprised of three components:

- Beneficial uses—ways in which humans and animals use the water
- Water quality criteria—specify the water quality required to protect beneficial uses (numeric or narrative)
- Antidegradation—a policy designed to maintain and protect water quality

These components are described in the sections that follow.

4.3.1 Beneficial Uses

Water bodies are assigned beneficial uses based on their expected or current uses. From IDAPA 58.01.02.100, beneficial uses are any of the various uses for which citizens utilize the state's waters, including, but not limited to:

- Aquatic life
- Recreation (primary contact, secondary contact)
- Water supply (domestic, agricultural, and industrial)

- Wildlife habitats
- Aesthetics

The CWA also requires Idaho to recognize existing uses, which are uses attained in a water body on or after November 28, 1975, whether or not they are designated uses. While a water body may have competing beneficial uses, the CWA requires DEQ to protect the most sensitive use.

In some cases, a water body does not have designated uses. For these water bodies, DEQ applies a presumed use protection, meaning the water body will be protected for cold water aquatic life and contact recreation. DEQ must also consider and ensure the attainment and maintenance of the water quality standards of downstream waters when establishing designated uses. Designated and presumed uses apply unless a use attainability analysis (UAA) is conducted by DEQ and approved by EPA. Existing uses cannot be removed.

Permit writers should consider whether a water body is supporting its designated beneficial uses when identifying any additional pollutants of concern in the effluent. Permit writers will check the most current Integrated Report and confer with the regional office assessment coordinators to determine the beneficial use support status of the receiving water and any downstream assessment units that may be impacted by the discharge.

DEQ may consider any pollutant associated with an impairment (DEQ 2015) of the receiving water a pollutant of concern in permit development, regardless of whether an approved TMDL has been developed for that pollutant, a TMDL WLA has been assigned to the facility, or the permitted facility has demonstrated that the pollutant is present in its effluent. DEQ may consider monitoring requirements to collect additional data related to the presence or absence of the impairing pollutant in a specific discharge to provide information for further analyses.

4.3.2 Water Quality Criteria

Water quality criteria are scientifically determined parameters or constituents that are sufficiently supportive of the water body's designated uses. These can include both numeric and narrative criteria. Numeric water quality criteria are developed for specific parameters to protect wildlife, aquatic life, and human health from pollutants' deleterious effects. DEQ has established narrative criteria where numeric criteria cannot be established or to supplement numeric criteria. As new or revised numeric and narrative criteria are developed the RPA and effluent limit development will comply with EPA approved criteria. Criteria and calculations identified below are examples based on WQS effective in 2016, please reference current WQS to ensure calculations are using the most current criteria.

4.3.2.1 Numeric Criteria—Aquatic Life

Numeric criteria for aquatic life use designations are designed to protect aquatic organisms, including both plants and animals. Aquatic life criteria address both short-term (acute) and long-term (chronic) effects on species. Each of these criteria typically consists of three components:

- **Magnitude:** The level of pollutant or pollutant parameter, usually expressed as a concentration, that is allowable.
- **Duration:** The period (averaging period) over which the in-stream concentration is averaged for comparison with criteria concentrations.
- **Frequency:** How often criteria may be exceeded.

Most Idaho numeric criteria developed to support aquatic life use the 1-hour duration for criterion maximum concentrations (CMC – acute) and the 4-day duration for criterion continuous concentrations (CCC – chronic). An exception is ammonia. Ammonia criteria use 1-hour CMC and 30-day CCC durations.

Below is an example of freshwater aquatic life criteria for chlorine (IDAPA 58.01.02.210):

- CMC—The maximum instantaneous or one (1) hour average concentration of total residual chlorine (TRC) may not exceed 19 µg/L more than once every three (3) years.
- CCC—The four (4) day average concentration of TRC may not exceed 11 µg/L more than once every three (3) years.

Idaho WQS also include aquatic life criteria for parameters such as temperature, pH, and dissolved oxygen that differ from other chemical constituents. Temperature criteria are expressed as both absolute temperature values (e.g., temperature may not exceed 22 degrees Celsius [°C]) and restrictions on causing changes in temperature in the water body (e.g., temperatures in lakes shall have no measureable change from natural background conditions). Criteria for pH are expressed as an acceptable pH range (6.5-9.0 s.u.) in the water body. DEQ's dissolved oxygen WQS include both concentrations and percent oxygen saturation that must be maintained.

Where no specific numeric aquatic life criteria have been established for a pollutant, permit writers should address the pollutant using narrative criteria for hazardous materials and toxics from IDAPA 58.01.02.200. This includes performing an RPA for whole effluent toxicity (WET). Subsequently, WET monitoring and development of appropriate WET effluent limits will appear in the permit, if appropriate, and documented in the fact sheet.

4.3.2.1.1 Calculating Metals and Ammonia Criteria

Several commonly monitored metals and ammonia have criteria that are expressed as equations which account for the effects of other environmental conditions. To determine whether a criterion is met, the permit writer must not only have the results of ambient and/or effluent monitoring for the pollutant of concern, but must also have access to information specific to the monitoring site and period. Calculation spreadsheets are available on the DEQ web page to calculate criteria values for metals and ammonia; *http://www.deq.idaho.gov/water-quality/surface-water/water-quality-criteria/*. The following sections explain how criteria calculations are made.

Metals

One factor which impacts metal criteria is known as the water effects ratio (WER). The WER is the ratio of the WET test toxicity to aquatic life when solutions composed with receiving water are compared to solutions of laboratory dilution water. Typically, the WER is assigned a value of one (1.0) because no discernable difference exists between the two solutions. DEQ may assign a different WER value to protect the water body's designated uses for the pollutant's toxic effects (IDAPA 58.01.02.210.03.c.iii). Arsenic and chromium VI have modifying coefficients listed in the table at IDAPA 58.01.02.210.01. Calculated criteria values will differ from these coefficients if the WET based WER is other than one (1.0).

Also consider hardness dependent metals (cadmium, chromium (III), lead, nickel, silver, and zinc), which are calculated using hardness, standard coefficients, conversion factors, and the

WER. The aquatic life criteria are a function of total hardness (mg/L as calcium carbonate), the pollutants' WER (IDAPA 58.01.02.210.03.c.iii) and multiplied by an appropriate conversion factor as defined in IDAPA 58.01.02.210.02. The WQS (IDAPA 58.01.02.210.02) includes a table with coefficients and conversion factors. Hardness dependent metals criteria are calculated using values from this table using Equation 11 and Equation 12:

$$\text{CMC} = \text{WER}\exp(mA[\ln(hardness)] + bA) \times Acute\ Conversion\ Factor$$

Equation 11. Calculation for hardness dependent metals criteria (acute).

$$\text{CCC} = \text{WER}\exp(mc[\ln(hardness)] + bc) \times Chronic\ Conversion\ Factor$$

Equation 12. Calculation for hardness dependent metals criteria (chronic).

Where:

WER = Water Effects Ratio (IDAPA 58.01.02.210.03.c.iii)
exp = base e exponential function
mA = slope of the acute regression line
ln hardness = natural log of total hardness (mg/L as calcium carbonate)
bA = y-intercept of the acute regression line
Acute Conversion Factor = total to dissolved conversion factor
mc = slope of the chronic regression line
bc = y-intercept of the chronic regression line
Chronic Conversion Factor = total to dissolved conversion factor

The acute and chronic conversion factors for cadmium and lead need to be calculated with Equation 13–Equation 15:

$$\text{Cadmium Acute CF} = 1.136672 - [(\ln hardness)(0.041838)]$$

Equation 13. Acute conversion factor calculation for cadmium.

$$\text{Cadmium Chronic CF} = 1.101672 - [(\ln hardness)(0.041838)]$$

Equation 14. Chronic conversion factor calculation for cadmium.

$$\text{Lead (acute and chronic) CF} = 1.46203 - [(\ln hardness)(0.415712)]$$

Equation 15. Acute and chronic conversion factor calculation for lead.

Hardness dependent metal calculation considerations:

- Hardness used for metals criteria calculation must not be less than 25 mg/L as calcium carbonate (IDAPA 58.01.02.210.03.c.i) for metals other than cadmium.
- For cadmium, hardness used for criteria calculation must not be less than 10 mg/L as calcium carbonate, except as specified in 210.03.c.ii and 210.03.c.iii (IDAPA 58.01.02.210.03.c.i).

- Maximum hardness allowed in criterion calculation equations shall not be greater than 400 mg/L as calcium carbonate, except as specified in 210.03.c.ii and 210.03.c.iii (IDAPA 58.01.02.210.03.c.i).

The cold water aquatic life for cadmium, with a receiving water hardness of 10 mg/L calcium carbonate use Equation 11 and Equation 12, respectively:

$$\text{CMC} = \text{WER} \exp(mA[\ln hardness] + bA) \times 1.136672 - [(\ln hardness)(0.041838)] = 0.20\ \mu g/L$$

$$\text{CCC} = \text{WER} \exp(mc[\ln hardness] + bc) \times 1.101672 - [(\ln hardness)(0.041838] = 0.15\ \mu g/L$$

Ammonia

The magnitude of other aquatic life criteria can vary according to other conditions in the water or even based on the presence or absence of certain aquatic life. For example, Idaho’s ammonia criteria address magnitude, frequency, and duration as well as variation due to pH, temperature, the presence or absence of salmonid species, and the presence or absence of early life stages of fish. Below are the IDAPA 58.01.02.250.02.d criteria for ammonia to support cold water aquatic life with and without fish early life stages present:

- CMC—The one (1) hour average concentration of total ammonia nitrogen (in mg N/L) is not to exceed, more than once every three (3) years, the value calculated using Equation 16:

$$\text{CMC} = \frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}}$$

Equation 16. Calculation for ammonia criteria (acute).

Where: pH = 95th percentile of pH in the receiving water upstream from the discharge.

- CCC—The thirty (30) day average concentration of total ammonia nitrogen (in mg N/L) is not to exceed, more than once every three (3) years, the value calculated using Equation 17 and Equation 18:

When fish early life stages are likely present:

$$\text{CCC} = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) x\ MIN\ (2.85, 1.45x10^{0.028x(25-T)})$$

Equation 17. Calculation for ammonia criteria (chronic, early life stages present).

Where:

pH = 95th percentile of pH in the receiving water upstream from the discharge
T = 95th Percentile of the ambient upstream receiving water temperature
MIN = the smallest value from the data set

When fish early life stages are likely absent:

$$\text{CCC} = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) x \left(1.45x10^{0.028x(25-T)}\right)$$

Equation 18. Calculation for ammonia criteria (chronic, early life stages absent).

Where:

pH = 95th percentile of pH in the receiving water upstream from the discharge
T = 95th Percentile of the ambient upstream receiving water temperature

For example, using Equation 16, where pH is 7.0 and temperature is 10.0°C, the cold water aquatic life ammonia criteria are:

$$\text{CMC} = \frac{0.275}{1+10^{7.204-7.0}} + \frac{39.0}{1+10^{7.0-7.204}} = 24 \text{ mg N/L}$$

Using Equation 17, when early life stages are likely present:

$$\text{CCC} = \left(\frac{0.0577}{1+10^{7.688-7.0}} + \frac{2.487}{1+10^{7.0-7.688}}\right) x\, MIN\left(2.85, 1.45x10^{0.028x(25-10)}\right) = 5.9 \text{ mg N/L}$$

Using Equation 18, when early life stages are likely absent:

$$\text{CCC} = \left(\frac{0.0577}{1+10^{7.688-7.0}} + \frac{2.487}{1+10^{7.0-7.688}}\right) x \left(1.45x10^{0.028x(25-10)}\right) = 7.9 \text{ mg N/L}$$

If concurrent hardness, pH, or temperatures are not available, the permit writer may use typical values, if known, for the water body in question for the period of interest. Whether or not typical values are used or monitoring data is used, the assumptions concerning these values must be documented in the fact sheet.

4.3.2.1.2 Special Considerations for Temperature Numeric Criteria

Idaho revised its WQS Point Source Wastewater Treatment Requirements (IDAPA 58.01.02.401) in 2012 to remove the numeric limits on point source induced changes in receiving water temperature unless more stringent limits are necessary to meet the applicable requirements of IDAPA 58.01.02.200 through 300, or unless specific exemptions are made pursuant to IDAPA 58.01.02.080.02. EPA has not yet approved or disapproved this WQS revision. Until EPA's final decision, prior EPA-approved treatment requirements apply.

Water Quality Standards. 2011. IDAPA 58.01.02.401:

01. **Temperature**. The wastewater must not affect the receiving water outside the mixing zone so that: (7-1-93)

a. The temperature of the receiving water or of downstream waters will interfere with designated beneficial uses. (7-1-93)

b. Daily and seasonal temperature cycles characteristic of the water body are not maintained. (7-1-93)

c. If the water is designated for warm water aquatic life, the induced variation is more than plus two (+2) degrees C. (3-15-02)

d. If the water is designated for cold water aquatic life, seasonal cold water aquatic life, or salmonid spawning, the induced variation is more than plus one (+1) degree C. (3-15-02)

e. If temperature criteria for the designated aquatic life use are exceeded in the receiving waters upstream of the discharge due to natural background conditions, then Subsections 401.01.c. and 401.01.d. do not apply and instead wastewater must not raise the receiving water temperatures by more than three tenths (0.3) degrees C. (4-11-06)

4.3.2.2 Numeric Criteria—Human Health

Human health criteria for toxic pollutants are designed to protect people from exposure due to consumption of fish or other aquatic organisms, or from consumption of both water and aquatic organisms. Human health chronic criteria are based on lifetime exposure and express the highest concentrations of a pollutant that are not expected to pose significant long-term risk to human health. Other criteria for human health protection (e.g., bacteria criteria) consider a shorter-term exposure through water body use such as contact recreation. All Idaho human health numeric chemical criteria are based on an annual harmonic mean and are not to be exceeded.

Human health criteria for toxic pollutants are derived by considering the dose of a pollutant that is ingested by humans. The criteria are based on a human health reference dose; a relative source contribution; a human body weight (BW) (for adults); a drinking water volume of 2.4 L/day; and a total fish consumption rate for the general population. A weighted average of all fish trophic levels are used to calculate the fish consumption rate. In waters inhabited by species listed as threatened or endangered under the Endangered Species Act or designated as their critical habitat, the Department will apply the human health fish tissue residue criterion for methylmercury to the highest trophic level available for sampling and analysis. These criteria are protective of the general population; however a site-specific criterion or a criterion for a particular subpopulation may be calculated by using local or regional data.

Where no specific numeric human health criteria have been established for a pollutant, permit writers should address the pollutant using narrative criteria for hazardous materials and toxics from IDAPA 58.01.02.200.

4.3.2.3 Narrative Criteria

DEQ WQS also include narrative water quality criteria to supplement numeric criteria. Narrative criteria are statements that describe the desired water quality goal for a water body. Narrative criteria, for example, require that surface water be “free from hazardous materials in concentrations found to be of public health significance or to impair designated beneficial uses” or “free from toxic substances in concentrations that impair designated beneficial uses.” DEQ can use narrative criteria as the basis for limiting specific pollutants for which numeric criteria do not exist or as the basis for limiting toxicity using WET requirements where the toxicity has not yet been traced to a specific pollutant or pollutants. DEQ’s narrative criteria are outlined in 58.01.02.200 – General Surface Water Quality Criteria.

Narrative criteria for dissolved oxygen require that surface waters be free from oxygen demanding materials in concentrations that would result in anaerobic water conditions. The narrative criteria are addressed in unison with numeric dissolved oxygen criteria by modeling dissolved oxygen concentrations and limiting discharges of oxygen-demanding pollutants such as BOD, COD, and nutrients (phosphorus and nitrogen).

Considerations for Nutrients

DEQ has not adopted numeric criteria for nutrients as part of its WQS. Therefore, DEQ needs to determine appropriate nutrient effluent concentrations based on the assimilative capacity of the receiving water and may consider use of criteria recommended by EPA or used in states with similar environmental conditions in RPA evaluations. EPA has developed nutrient criteria recommendations that are numeric values for both causative (phosphorus and nitrogen) and response (chlorophyll a and turbidity) variables associated with the prevention and assessment of eutrophic conditions.

EPA's recommended nutrient criteria are different from most of its other recommended criteria, such as the criteria for cadmium and ammonia. First, EPA's recommended nutrient criteria are ecoregional rather than nationally applicable criteria, and they can be refined and localized using nutrient criteria technical guidance manuals. Second, the recommended nutrient criteria represent conditions of surface waters that have minimal impacts caused by human activities rather than values derived from laboratory toxicity testing. Third, the recommended nutrient criteria do not include specific duration or frequency components; however, the ecoregional nutrient criteria documents indicate that states may adopt seasonal or annual averaging periods for nutrient criteria instead of the 1-hour, 24-hour, or 4-day average durations typical of aquatic life criteria for toxic pollutants. The ecoregional nutrient criteria documents, technical guidance manuals, and other information on EPA's nutrient criteria recommendations, are available on the Water Quality Criteria for Nitrogen and Phosphorus Pollution Website: *https://www.epa.gov/nutrient-policy-data/ecoregional-criteria*.

4.3.2.4 Site-Specific Water Quality Criteria Implementation

DEQ's water quality criteria may not always reflect the toxicity of a pollutant in a specific water body. Therefore, IDAPA 58.01.02.275 allows development of new water quality criteria or modification of existing criteria that will effectively protect designated and existing beneficial uses in certain water bodies as a result of site-specific analyses. As with all water quality criteria, site-specific criteria must be based on sound scientific principles to protect the beneficial use. Site-specific criteria are subject to EPA review and approval prior to use for CWA purposes, including IPDES permits.

A permit writer should review IDAPA 58.01.02.276-299 for site specific criteria applicable to the receiving water and verify that the applicable standard has been approved by EPA. Site specific criteria supersede IDAPA 58.01.02.210, 250, 251, 252, and 253 for water bodies and pollutants specified in these sections. Site specific criteria in the WQS that are approved by EPA include dissolved oxygen standards for waters discharged from dams, reservoirs and hydroelectric facilities, and metals, WER, ammonia, dissolved oxygen, and temperature criteria for specified water bodies in Idaho.

4.3.2.5 Water Quality Standard Variances and Intake Credits

The CWA and state regulations provide limited mechanisms for variances, waivers, and intake credits from requirements in WQS. An IPDES permit applicant must meet very specific data and application deadline requirements before a variance, waiver, or intake credit may be granted. These mechanisms provide a unique exception to particular requirements, and no expectation to receive a similar permit condition should be assumed by the permittee or applicant. Table 22 explains the available variances and intake credits from WQS for dischargers.

Table 22. Available WQS variances and intake credits for IPDES permits.

Request Type	Eligible	CWA	Regulation	Application Deadline[a]	Granting Authority[b]
Thermal discharge	All	316(a)	IDAPA 58.01.25.310 40 CFR 125.70–73	By close of the draft permit comment period if based on a WQBEL.	DEQ
Water quality standards	All	N/A	IDAPA 58.01.02.260 40 CFR 131.10(g)(1)–(6)	With a permit application (not specified in rules, necessary to ensure timely permit issuance).	DEQ[c]
Intake credits	All	N/A	IDAPA 58.01.25.303.07	By close of the draft permit comment period.	DEQ

[a]. Permittees are advised to contact DEQ 1 year in advance if considering applying for a variance. The 180-day requirement to submit a complete application for a new permit or permit renewal may not be sufficient to also complete a variance and receive EPA approval. Dischargers must submit all requests to DEQ.
[b.] Any approved variance or intake credit is effective for up to 5 years or the life of the IPDES permit. After 5 years or the permit expiration, the discharger must meet the standard or must reapply for the variance or intake credit. In considering a reapplication, DEQ requires the discharger to demonstrate reasonable progress toward meeting the standard. DEQ's decisions may be appealed to the Board of Environmental Quality.
[c] Variance from water quality standards—EPA must approve all changes to water quality standards, including variances from water quality standards.

The options listed above and the factors considered in a technical review are explained in the IPDES User's Guide Volume 1, Section 8 (DEQ 2016).

4.3.3 Antidegradation

Maintaining water quality better than the minimums set by water quality criteria is a primary objective of CWA. Each state is required to adopt an antidegradation policy as part of its WQS. DEQ's antidegradation policy is defined at IDAPA 58.01.02.051 and outlines the framework to be used in making decisions about proposed activities that will result in changes in water quality. The draft Idaho Antidegradation Implementation Procedures (DEQ draft 2017) are aimed at maintaining the existing quality of Idaho waters.

Effluent limits included in IPDES permits must be consistent with Idaho's antidegradation policy, which establishes three tiers of water quality protection. DEQ's antidegradation policy provides three levels of protection from degradation of existing water quality:

- **Maintenance of Existing Uses for All Waters (Tier I Protection)—**Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected in all water bodies (IDAPA 58.01.02.051.01). Where an existing use is established, it must be protected even if it is not listed in the WQS as a designated use. Tier I requirements apply to all surface waters.
- **High Quality Waters (Tier II Protection)—**Where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish and wildlife and recreation in and on the water, that quality shall be maintained and protected water quality may be lowered in Tier II waters but only with public review of the necessity for degradation based on the social and economic importance of the activity. In no case may water quality be lowered to a level that would interfere with existing or designated uses. (IDAPA 58.01.02.051.02).

- **Outstanding Resource Waters (Tier III Protection)—**Where an outstanding resource water has been designated by the legislature, that water quality shall be maintained and protected from the impacts of point and nonpoint source activities. Idaho currently has no outstanding resource waters. (IDAPA 58.01.02.051.03).

The objective of antidegradation is achieved by reviewing discharge permits for their effect on water quality. If the water receiving the discharge is of high quality (e.g., Tier II), proposed degradation in water quality is evaluated closely to determine if it can be minimized or avoided. If significant degradation cannot be avoided, then the activity is evaluated to determine if the activity is necessary and important to the social or economic health of the affected public.

5 Final Effluent Limits and Antibacksliding

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Key Terms

Citations for key terms used in this guide are provided below. To see the official definition for a term, users should go directly to the rule that is referenced.

Term	IDAPA, CFR, or CWA Citation
Antibacksliding	Clean Water Act section 402(o).
Application	IDAPA 58.01.25.010.03.
Background	IDAPA 58.01.25.010.08.
Balanced, Indigenous, Community (or Population)	40 CFR 125.71(c).
Best Management Practices (BMPs)	IDAPA 58.01.25.010.09.
Biochemical Oxygen Demand (BOD)	IDAPA 58.01.25.010.10.
Compliance Schedule or Schedule of Compliance	IDAPA 58.01.25.010.17.
Direct discharge	IDAPA 58.01.25.010.24.
Discharge	IDAPA 58.01.25.010.27.
Discharge Monitoring Report (DMR)	IDAPA 58.01.25.010.26.
Discharge of a Pollutant	IDAPA 58.01.25.010.28
Draft Permit	IDAPA 58.01.25.010.29
Effluent	IDAPA 58.01.25.010.30
Effluent Data	40 CFR 2.302(a)(2)(i)–(ii)
Effluent Limitation	IDAPA 58.01.25.010.31
Effluent Limitation Guidelines (ELG)	IDAPA 58.01.25.010.32
Existing Discharger	IDAPA 58.01.02.010.37
Facility or Activity	IDAPA 58.01.25.010.38
Fundamentally Different Factors	IDAPA 58.01.02.010.39
General Permit	IDAPA 58.01.02.010.40

Hydrologically-Based Design Flow	IDAPA 58.01.02.010.50 • 1Q10 (IDAPA 58.01.02.210.03.b.i) • 1B3 (IDAPA 58.01.02.210.03.b.ii) • 7Q10 (IDAPA 58.01.02.210.03.b.iii) • 4B3 (IDAPA 58.01.02.210.03.b.iv) • Harmonic Mean Flow (IDAPA 58.01.02.210.03.b.v)
Idaho Pollutant Discharge Elimination System (IPDES)	IDAPA 58.01.25.010.42
Indirect Discharger	IDAPA 58.01.25.010.45
Intake Pollutant	IDAPA 58.01.25.303.07.a.i
Interference	40 CFR 403.3(k)
Load Allocation (LA)	IDAPA 58.01.25.010.50
Major Facility	IDAPA 58.01.25.010.51
Method Detection Limit (MDL)	40 CFR 136, Appendix B
Minimum Level (ML)	40 CFR 136, Table 2
Mixing Zone	IDAPA 58.01.25.010.54
Municipality	IDAPA 58.01.25.010.55
National Pollutant Discharge Elimination System (NPDES)	IDAPA 58.01.25.010.56
New Discharger	IDAPA 58.01.25.010.57
New Source	IDAPA 58.01.25.010.58.a
Owner or Operator	IDAPA 58.01.25.010.62
Pass Through	40 CFR 403.3(p)
Permit	IDAPA 58.01.25.010.63
Person	IDAPA 58.01.25.010.64
Point source	IDAPA 58.01.25.010.65
Pollutant	IDAPA 58.01.25.010.66
Pretreatment	IDAPA 58.01.25.010.68
Process Wastewater	IDAPA 58.01.25.010.71
Publicly Owned Treatment Works (POTW)	IDAPA 58.01.25.010.73
Reasonable Potential Analysis (RPA)	58.01.25.302.06.a.ii–vi

Reasonable Potential to Exceed (RPTE)	58.01.25.302.06.a.ii–vi
Recommencing Discharger	IDAPA 58.01.25.010.75
Secondary Treatment	IDAPA 58.01.25.010.78
Sewage Sludge	IDAPA 58.01.25.010.84
Source	IDAPA 58.01.25.010.90
Storm Water	IDAPA 58.01.25.010.94
Technology-Based Effluent Limitation (TBEL)	IDAPA 58.01.25.010.95
Total Maximum Daily Load (TMDL)	IDAPA 58.01.02.010.100
Treatment Works Treating Domestic Sewage (TWTDS)	IDAPA 58.01.25.010.100
Variance	IDAPA 58.01.25.103
Wasteload Allocation (WLA)	IDAPA 58.01.25.010.104
Water Body (Unit)	IDAPA 58.01.02.010.110
Water Quality-Based Effluent Limitation (WQBEL)	IDAPA 58.01.25.010.107
Waters of the United States	IDAPA 58.01.25.003.aa
Whole Effluent Toxicity	IDAPA 58.01.25.010.110

Appendix A. Significant Figures and Precision for Permit Limits and Reporting

Pollutant	Typical Permit Limit Range	Standard Laboratory Technique	Concentration Value = Minimum Number of Significant Figures	DMR Reporting Precision
		Conventional Pollutants		
BOD	5.0 to 50 mg/L	DO Probe	< 10 mg/L = 2 sig figs > 10 mg/L = 2 sig figs	Report to 0.1 mg/L Report whole numbers
CBOD	2.0 to 45 mg/L	DO Probe	< 10 mg/L = 2 sig figs > 10 mg/L = 2 sig figs	Report to 0.1 mg/L Report whole numbers
TSS	5.0 to 80.0 mg/L	Filtration/ Gravimetric	<10 mg/L = 2 sig figs > 10 mg/L = 3 sig figs	Report to 0.1 mg/L
Temperature	77°F as a maximum	Various	Various	Report + 0.1 degrees F or C
Bacteria (fecal, E. coli, etc.)	126/235/406/576 for E. coli	Various	<10 = 1 sig fig >10 <100 = 2 sig figs >100 = 3 sig figs	Report whole numbers only
DO	8.0 to 10.0 mg/L	DO Probe	< 10 mg/L = 2 sig figs > 10 mg/L = 3 sig figs	Report to 0.1 mg/L
Total chlorine residual (method dependent)	0.02 to 1.0 mg/L 0.1 to 1.0 mg/L	Amperometric Titr. DPD – colorimetric	< 0.1 mg/L = 1 sig fig > 0.1 <10 mg/L = 2 sig figs >10 mg/L = 3 sig figs	Report to 0.01 mg/L Report to 0.1 mg/L Report to 0.1 mg/L
Minimum UV dose	35 millijoules			
pH	6.0 to 9.0	pH Probe	<10 = 2 sig figs >10 = 3 sig figs	Report to 0.1 pH unit
		Nutrients		
TKN	5.0 to 20.0 mg/L	Digest w/ ISE or Colorimetric	<10 mg/L = 2 sig figs >10 mg/L = 3 sig figs	Report to 0.1 mg/L
Total Ammonia as N	1.0 to 30.0 mg/L	Distill w/ ISE or Colorimetric IC	<10 mg/L = 2 sig figs >10 mg/L = 3 sig figs	Report to 0.1 mg/L
Nitrate and Nitrite	1.0 to 20.0 mg/L	Colorimetric or IC	<10 mg/L = 2 sig figs >10 mg/L = 3 sig figs	Report to 0.1 mg/L
Total Phosphorus	0.01 to 3.0 mg/L	Colorimetric	< 0.1 mg/L = 1 sig fig > 0.1 <10 mg/L = 2 sig figs >10 mg/L = 3 sig figs	Report to 0.01 mg/L Report to 0.1 mg/L Report to 0.1 mg/L
Dissolved Orthophosphate as P	0.01 to 3.0 mg/L	Colorimetric	< 0.1 mg/L = 1 sig fig > 0.1 <10 mg/L = 2 sig figs >10 mg/L = 3 sig figs	Report to 0.01 mg/L Report to 0.1 mg/L Report to 0.1 mg/L
		Toxics		
In Permit	In Permit	In Permit	In Permit	In Permit

Appendix B. Pollutants Regulated by Categorical Pretreatment Standards

	1,1,1-Trichloroethane	1,1,2,2-Tetra-chloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethylene	1,2,4-Trichloro- benzene	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,2-Diphenyl- hydrazine	1,2-trans-Dichloroethylene	1,3-Dichloro- benzene	1,3-Dichloro- propene	1,4-Dichloro- benzene	2,3,4,6-Tetra-chlorophenol	2,3-Dichloro- aniline	2,4,5-Trichloro- phenol	2,4,6-Trichloro- phenol	2,4-Dichlorophenol	2,4-Dimethyl- phenol	2,4-Dinitro- toluene	2,4-Dinitrophenol	2,6-Dinitro- toluene	2-Chloro- naphthalene	2-Chloroethyl vinyl ether (mixed)	2-Chlorophenol	2-Nitrophenol	3,3-Dichloro- benzidine	3,4,5-Trichloro- catechol	3,4,5-Trichloro- guaiacol	3,4,6-Trichloro- catechol	3,4,6-Trichloro- guaiacol	4,4-DDD	4,4-DDE
Aluminum Forming										X											X					X								
Battery Manufacturing																																		
Carbon Black Manufacturing																																		
Centralized Waste Treatment																X		X																
Coil Coating	X	X		X	X																													
Copper Forming	X																						X											
Electrical and Electronic Components	X		X		X	X	X	X		X		X		X				X	X							X	X							
Electroplating	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X		X	X	X					X	X
Feedlots																									X									
Fertilizer Manufacturing																																		
Glass Manufacturing																																		
Grain Mills																																		
Ink Formulating																																		
Inorganic Chemicals Manufacturing																																		
Iron and Steel Manufacturing																																		
Leather Tanning and Finishing																																		
Metal Finishing	X	X	X	X	X		X	X	X	X	X																						X	X
Metal Molding and Casting	X					X						X	X	X				X	X	X	X	X	X	X		X	X	X						
Nonferrous Metals Form./Metal																									X									
Nonferrous Metals Manufacturing																		X	X	X						X								
Oil and Gas																																		
Organic Chems., Plastics, and Syn.	X		X	X	X		X	X	X		X																							
Paint Formulating																																		
Paving and Roofing Materials						X						X	X	X													X							
Pesticide Chemicals	X				X		X	X	X		X																							
Petroleum Refining																																		
Pharmaceutical Manufacturing							X	X					X	X																				
Porcelain Enameling																																		
Pulp, Paper, and Paperboard																																		
Rubber Manufacturing																																		
Soap and Detergent Manufacturing															X		X	X											X	X	X	X		
Steam Electric Power Generating	X	X	X	X	X		X	X	X	X	X																						X	X
Timber Products Processing																																		
Transportation Equip. Cleaning						X						X	X	X				X	X	X	X	X	X	X		X	X	X						
Waste Combustors																									X									

	4,4-DDT	4,5,6-Trichloro- quaiacol	4,6-Dinitro-o- cresol	4-Bromophenyl phenyl ether	4-Chlorophenyl phenyl ether	4-Nitrophenol	Acenaphthene	Acenaphthylene	Acetone	Acrolein	Acrylonitrile	Aldrin	Alpha- endosulfan	Alpha-BHC	Ammonia (as N)	Anthracene	Benzene	Benzidine	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (ghi) perylene	Benzo (k) fluoranthene	Beta-BHC	Beta-endosulfan	Bis (2-chloro- ethoxy) methane	Bis (2-chloro- ethyl) ether	Bis (2-chloro- isopropyl) ether	Bis (2-ethyl- hexyl) phthalate	BOD	Bromoform	Butyl benzyl phthalate	Carbazole	Carbon tetrachloride
Aluminum Forming							X	X								X				X	X	X							X					
Battery Manufacturing																																		
Carbon Black Manufacturing																																		
Centralized Waste Treatment																													X				X	
Coil Coating																											X		X			X		
Copper Forming																X	X																	
Electrical and Electronic Components						X										X													X			X		X
Electroplating	X		X	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X
Feedlots																																		
Fertilizer Manufacturing															X																			
Glass Manufacturing																																		
Grain Mills																														X				
Ink Formulating																																		
Inorganic Chemicals Manufacturing																																		
Iron and Steel Manufacturing															X																			
Leather Tanning and Finishing																																		
Metal Finishing	X		X		X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X			
Metal Molding and Casting				X		X	X	X								X	X		X	X	X		X						X			X		X
Nonferrous Metals Form./Metal															X																			
Nonferrous Metals Manufacturing															X					X												X		
Oil and Gas																																		
Organic Chems., Plastics, and Syn.			X			X	X									X	X												X					
Paint Formulating																																		
Paving and Roofing Materials																																		X
Pesticide Chemicals																	X														X			
Petroleum Refining															X																			
Pharmaceutical Manufacturing									X						X		X																	X
Porcelain Enameling																																		
Pulp, Paper, and Paperboard		X																																
Rubber Manufacturing																																		
Soap and Detergent Manufacturing																																		
Steam Electric Power Generating	X		X		X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X			
Timber Products Processing																																		
Transportation Equip. Cleaning				X																												X		X
Waste Combustors																																		

	Chlordane (tech. mix. & metabolites)	Chlorobenzene	Chlorodibromo-methane	Chloroethane	Chloroform	Chrysene	COD	Cresol	Delta-BHC	Dibenzo (a,h) anthracene	Dichlorobromo-methane	Dieldrin	Diethyl phthalate	Diethylamine	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Endosulfan sulfate	Endrin	Endrin aldehyde	Ethyl acetate	Ethylbenzene	Flow Restrictions Only	Fluoranthene	Fluorene	Fluoride	Gamma-BHC	Heptachlor	Heptachlor epoxide	Hexachloro- benzene	Hexachloro- ethane	Hexachlorobuta- diene	Hexachlorocyclo pentadiene	Indeno (1,2,3- cd)pyrene
Aluminum Forming						X				X			X			X		X	X	X		X		X	X									X
Battery Manufacturing																																		
Carbon Black Manufacturing																																		
Centralized Waste Treatment								X																X										
Coil Coating					X											X										X								
Copper Forming					X																	X												
Electrical and Electronic Components					X						X					X						X				X								
Electroplating		X	X	X	X	X			X	X	X	X	X		X	X	X	X	X	X		X		X	X		X	X	X	X	X	X	X	X
Feedlots	X																						X											
Fertilizer Manufacturing																																		
Glass Manufacturing																										X								
Grain Mills																																		
Ink Formulating																							X											
Inorganic Chemicals Manufacturing							X																			X								
Iron and Steel Manufacturing																																		
Leather Tanning and Finishing																																		
Metal Finishing																														X	X	X	X	X
Metal Molding and Casting		X	X	X	X	X			X	X	X	X	X		X	X	X	X	X	X		X		X	X		X	X	X					
Nonferrous Metals Form./Metal	X																									X								
Nonferrous Metals Manufacturing		X			X	X							X		X	X								X	X	X				X				
Oil and Gas																							X											
Organic Chems., Plastics, and Syn.																														X	X		X	
Paint Formulating																							X											
Paving and Roofing Materials		X		X	X								X		X							X		X	X									
Pesticide Chemicals																																		
Petroleum Refining																																		
Pharmaceutical Manufacturing		X	X		X						X											X												
Porcelain Enameling																																		
Pulp, Paper, and Paperboard		X			X									X							X													
Rubber Manufacturing							X																											
Soap and Detergent Manufacturing					X																		X											
Steam Electric Power Generating																														X	X	X	X	X
Timber Products Processing																																		
Transportation Equip. Cleaning		X	X	X	X	X			X	X	X	X	X		X	X	X	X	X	X		X		X	X		X	X	X					
Waste Combustors	X																																	

	Isobutylaldehyde	Isophorone	Isopropyl acetate	Isopropyl ether	Methyl bromide	Methyl cellosolve	Methyl chloride	Methyl formate	Methyl Isobutyl Ketone	Methylene chloride	n-Amyl acetate	Naphthalene	n-Butyl acetate	n-Decane	n-Heptane	n-Hexane	Nitrate (as N)	Nitrobenzene	N-nitrosodi-methylamine	N-nitrosodi-phenylamine	N-nitrosodi-n-propylamine	n-Octadecane	Non-polar material (SGT-HEM)	Oil (mineral)	Oil and Grease	Organic Nitrogen (as N)	Parachloro- metacresol	PCB–1016	pH	Phenols	Phosphorus	Sulfide	TSS
Aluminum Forming		X										X								X					X		X	X					
Battery Manufacturing																																	
Carbon Black Manufacturing																									X								
Centralized Waste Treatment														X								X											
Coil Coating										X															X						X		
Copper Forming										X		X								X					X								
Electrical and Electronic Components		X								X		X																					
Electroplating		X			X		X			X		X						X	X	X	X						X	X					
Feedlots																																	
Fertilizer Manufacturing																	X									X			X		X		
Glass Manufacturing																								X									
Grain Mills																																	X
Ink Formulating																																	
Inorganic Chemicals Manufacturing																													X				
Iron and Steel Manufacturing												X																		X			
Leather Tanning and Finishing																													X			X	
Metal Finishing		X			X		X			X		X						X	X	X	X						X	X					
Metal Molding and Casting										X		X													X		X			X			
Nonferrous Metals Form./Metal																			X	X	X												
Nonferrous Metals Manufacturing																														X			
Oil and Gas																																	
Organic Chems., Plastics, and Syn.							X			X		X						X															
Paint Formulating																																	
Paving and Roofing Materials																									X								
Pesticide Chemicals					X		X			X		X																					
Petroleum Refining																									X								
Pharmaceutical Manufacturing	X		X	X		X		X	X	X	X		X		X	X																	
Porcelain Enameling																																	
Pulp, Paper, and Paperboard																					X												
Rubber Manufacturing																									X								
Soap and Detergent Manufacturing																																	
Steam Electric Power Generating		X			X		X			X		X						X	X	X	X						X	X					
Timber Products Processing																									X								
Transportation Equip. Cleaning																																	
Waste Combustors																							X										X

Appendix C.

Endnotes: IDAPA and CFR References