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Analytical Detection and Quantification Limits: Survey of State and Federal Approaches

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Analytical Detection and Quantification Limits: Survey of State and Federal Approaches

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Abstract

As analytical methods and technologies continue to improve, and trace concentrations of pollutants in ambient waters are better quantified, regulatory agencies are increasingly setting effluent permit limits for some pollutants near analytical detection limits, and establishing policies for determining compliance with these stringent limits. The American Petroleum Institute (API) conducted a review of state policies related to analytical detection and quantification limits, with particular focus on water quality and wastewater issues in permitting and compliance. Of the ten states considered in this review, every state was found to incorporate detection or quantification terms in its regulations to some extent. Some of the states prefer to have the most detailed policies in their water quality implementation procedures; other states prefer to put the detail directly in the regulations. Most of the states specify, either in their regulations or implementation procedures, how compliance is demonstrated. Permittees can ensure that they obtain permit limits that do not cause compliance monitoring problems by paying particular attention to effluent data during the permit application process, by identifying early in the permitting process the need for site-specific detection and quantification limits, and by understanding the state's permit requirements and policies specifying how compliance is to be demonstrated.

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Executive Summary

The American Petroleum Institute (API) conducted a review of state policies related to analytical detection and quantification limits, with particular focus on water quality and wastewater issues in permitting and compliance. Ten states were reviewed: Alabama, California, Illinois, Louisiana, New Jersey, Ohio, Oklahoma, Pennsylvania, Texas, and Washington.

Summary findings of this review are:

- Every state incorporates detection or quantification terms in its regulations. Terms referenced in regulations are usually defined in the regulations, but not always. The most frequently used terms are detection limit/level, method detection limit (MDL), and practical quantitation level (PQL). Minimum level (ML) is used by Alabama, California, Illinois, and Ohio.`
- The states vary in the extent to which detection and quantification terms are incorporated into their regulatory language. Some states prefer to have the most detailed policies in their water quality implementation procedures; other states prefer to put the detail directly in the regulations.
- The states will set wastewater permit limits at or below detection or quantification levels, where considered protective of water quality. Most states specify, either in their regulations or implementation procedures, how compliance is demonstrated in such cases. Compliance with a maximum concentration limit is demonstrated by a "less-than" analytical result (a detection or quantification limit, as applicable). Where a mass load or average concentration is calculated, most states specify that zero be used in lieu of less-than values. In some situations, one-half the detection limit must be used.
- Although the states have procedures for allowing wastewater permittees to develop site-specific detection or quantification limits based on state- or EPA-defined methods, none of the states had specific procedures for developing or approving alternative methods. State staff indicated that approval of alternative methods would be on a case-by-case basis, and likely coordinated with the USEPA.
- Permittees can ensure that they obtain permit limits that do not cause compliance monitoring problems related to detection and quantification issues. During the permitting process, permittees should pay particular attention to effluent data in the application, the need for site-specific detection and quantification limits or procedures, and permit requirements specifying how compliance is to be demonstrated.

Introduction

The purpose of this review was to determine the analytical detection and quantification limit policies of various state agencies. Of particular interest were policies for setting wastewater discharge permit limits at or below detection or quantification limits, for determining compliance with such limits, and for using alternative approaches to determining detection or quantification limits. Although the main focus of this review was on state policies involving water quality issues, included in the review were the policies of programs in other environmental areas as well as in federal regulations and statutes.

Ten states were selected for review: Alabama, California, Illinois, Louisiana, New Jersey, Ohio, Oklahoma, Pennsylvania, Texas, and Washington. State environmental regulations and water quality implementation procedures were reviewed, and state environmental staff were contacted and interviewed, to obtain information on detection and quantification limit policies.

Overview of Report

Presented first is an overview of approaches for analytical detection and quantification limits in environmental programs. The overview describes various detection and quantification terms, including method detection limit (MDL), minimum level (ML), practical quantitation (or quantification) level (PQL), alternative minimum level (AML), interlaboratory quantification estimate (IQE), and others. Next, the policies of the ten selected states are presented. Lastly, recommendations are provided for setting effluent limits and compliance monitoring requirements in wastewater discharge permits.

Overview of Approaches

This section provides an overview of selected approaches for determining analytical detection and quantification levels used in environmental programs. Table 1 lists the terms most often used in these programs, as well as two alternatives (AML, IQE) that have been suggested by others. In the following sections, these terms, as they are used in wastewater programs, are discussed in detail, and their similarities and differences are compared. Terms used in other environmental programs, both state and federal, are identified.

Water and Wastewater Programs

The most common detection and quantification limits in water and wastewater programs are the MDL, ML, and PQL. The MDL can be used to calculate both the ML and the PQL. Variations of these and other related terms can be found in water and wastewater programs. Definitions of these terms as given in the regulations are provided

Table 1
Detection and Quantification Terms

Detection Terms	
DL	Detection limit
LOD	Limit of detection
MDL	Method detection limit
Quantification Terms	
AML	Alternative minimum level
IQE	Interlaboratory quantification estimate
LOQ	Limit of quantitation
ML	Minimum level
PQL	Practical quantitation level
	Practical quantification level

in Table 2; no references to analytical detection terms were found in federal environmental statutes. These basic definitions are discussed in the following sections.

Detection Levels

The USEPA has a specific definition of the MDL in its regulations. Among the various state and federal programs, there may be modifications to this definition or references to other detection terms (some defined and some not).

Method Detection Limit (MDL)

The MDL is a detection term defined by the USEPA as:

> "…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." [40 *CFR* 136, Appendix B]

The typical MDL procedure is to analyze seven aliquots of a sample at a low concentration, 1 to 5 times the estimated MDL. The MDL can be measured in reagent water (water with no impurities) or in any wastewater matrix (matrix-specific MDL). If the sample does not already contain the analyte in this concentration range, it is spiked with the analyte. The standard deviation of the seven analytical values is calculated. The

Table 2
Other Detection and Quantification Terms
Used in Federal Water and Wastewater Programs

Term	Definition	Reference
Drinking Water		
Detection level	The lowest concentration of a target contaminant that a given method or piece of equipment can reliably ascertain and report as greater than zero (e.g., instrument detection limit, method detection limit, or estimated detection limit).	40 *CFR* 141.35
Practical quantitation level	No definition given in regulations	40 *CFR* 141.81 40 *CFR* 141.89
Effluent Guidelines		
Instrument detection limit	No definition given in regulations	40 *CFR* 430, Appendix A
Method detection limit	The minimum concentration of a substance that can be identified, measured and reported with 99 percent confidence that the analyte concentration is greater than zero and determined from analysis of a sample in a given matrix containing analyte [sic].	40 *CFR* 425, Appendix C
Method detection limit	No definition given in regulations	40 *CFR* 434.64
Pretreatment Standards		
Analytical detection limit	No definition given in regulations	40 *CFR* 403.6
Water Quality Standards		
Quantification level	A measurement of the concentration of a contaminant obtained by using a specified laboratory procedure calibrated at a specified concentration above the method detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring the contaminant.	40 *CFR* 132.2
Minimum level Quantification level	The minimum level (ML) specified in or approved under 40 *CFR* 136 for the method for that pollutant. If no such ML exists, or if the method is not specified or approved under 40 *CFR* 136, the quantification level shall be the lowest quantifiable level practicable.	40 *CFR* 132, Appendix F

MDL is calculated as the standard deviation multiplied by the "Student's" t value for the 99th percentile (3.143 for seven analyses).

Limit of Detection (LOD)

The LOD is defined by the American Chemical Society (ACS) as:

> "…the lowest concentration level that can be determined to be statistically different from a blank."
> [ACS 1983, pg. 2216]

The LOD is calculated as three times the standard deviation, σ, at either zero (blank) or the lowest level of measurement. It differs from the USEPA's MDL in the multiplying factor [3 versus 3.143 (or other Student's t value)] and in not having a recommended number of replicate analyses. Use of σ, the population standard deviation, implies an infinite number of analyses, or at least a very large number. In practice, the sample standard deviation, s, would be used as a substitute for σ.

Other Detection Terms

Other detection terms used in state programs are discussed in the section on **State Policies**. Those found in federal regulations are listed in Table 2.

Quantification Levels

The USEPA's approaches to the ML and PQL are described in the following sections. Although the term LOQ is not used per se in these programs, a description of the term is also provided because of its relation to the ML. The AML and IQE, which have been promoted to the USEPA as improved quantification levels, are also described. Following these descriptions is a summary of other quantification terms used in water and wastewater programs.

Minimum Level

The ML is a quantification term defined by the USEPA as:

> "The concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all of the method-specified sample weights, volumes, and processing steps have been followed."[1]

The ML concept and how it is calculated have evolved over time. Currently, MLs are usually either calculated as 3.18 times the MDL, or set equal to the lowest calibration standard. The factor of 3.18 is derived from another quantification term, the LOQ (see description later in this section).

[1] "National Guidance for the Permitting, Monitoring, and Enforcement of Water Quality-Based Effluent Limitations Set Below Analytical Detection/Quantitation Levels," Draft, U.S. Environmental Protection Agency, Washington, DC, March 22, 1994.

Interim Minimum Level

Interim minimum level (IML) is a term created by the USEPA to describe MLs that are based on 3.18 times the MDL, to distinguish them from MLs that have been promulgated.

Practical Quantitation Level

The PQL is a quantitation term originally developed by the USEPA for its drinking water program. The USEPA defined the PQL as:

> "The lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions…"
>
> [50 FR 46906]

The PQL is intended to account for interlaboratory variability and matrix effects on quantitation. PQLs may be based on USEPA laboratory performance evaluation (PE) studies, choosing a level at which a majority of the laboratories can obtain results within a given range—for example, 80% of the laboratories fall within ±40% of the true value. In practice, a PQL usually is set at 5 to 10 times an MDL based on reagent water. Thus, if the MDL is used to calculate both the PQL and ML, the PQL will be higher.

Limit of Quantitation

The LOQ is defined by the ACS as:

> "…the level above which quantitative results may be obtained with a specified degree of confidence."
>
> [ACS 1983, pg. 2216]

It is calculated as 10 times the standard deviation, σ, at either zero (blank) or the lowest level of measurement. Thus, it is 3.33 times the LOD ($10\sigma \div 3\sigma$). The USEPA equates its ML to the LOQ (10σ) and its MDL sample standard deviation, s, to σ. Because the USEPA's MDL is $3.143s$, its ML is 3.18 times the MDL ($10s \div 3.143s = 3.18$).

The factor of 10 in the LOQ approach is based on a target performance level, measured by a relative standard deviation (RSD) of 10%, or conversely, a signal-to-noise ratio of 10:1. The choice of 10% is arbitrary, but is considered reasonable.

Interlaboratory Quantification Estimate

The IQE is published by the American Society for Testing and Materials (ASTM) as the standard procedure D6512-00, "Standard Practice for Interlaboratory Quantitation

Estimate." The IQE is associated with Z% relative standard deviation (IQEZ%). The IQEZ% is calculated as the lowest concentration for which a single measurement from a laboratory in a group of qualified laboratories in an interlaboratory study will have an estimated Z% relative standard deviation, based on the interlaboratory standard deviation. Z is typically an integer multiple of 10 (10, 20, 30, etc.).

Alternative Minimum Level

The AML is defined by Gibbons et al. (1997) on the same basis as USEPA's ML, but with notable differences. Like the ML, the AML is defined as the concentration at which the instrument response is 10 times the standard deviation, *s*. With the AML, the standard deviation is calculated as a function of concentration, whereas the ML uses a fixed standard deviation from a set of replicate analyses. The AML can account for interlaboratory variability and sample matrix effects. Where only single laboratory (intralaboratory) data are available, an adjustment is made to estimate an interlaboratory value.

Other Terms

Other quantification terms used in state programs are discussed in **State Policies**. Those found in federal regulations are listed in Table 2. Definitions are included in Table 2 if they were given in the regulations. No references to analytical quantification terms were found in federal environmental statutes.

Comparison of Approaches

A comparison of the USEPA's approaches (MDL, ML, PQL) to the alternate AML and IQE is provided in Table 3. The LOD and LOQ approaches are included in the comparison because of their relationship to the others. Table 3 lists for each term its calculation basis, its advantages, and its disadvantages or issues of concern.

The MDL is simple to calculate and widely used in regulatory programs, but has been criticized for various reasons. Because it assumes that the standard deviation does not vary with concentration, its calculation is sensitive to the choice of concentration for the replicate analyses instead of the actual capability of the analytical method. The standard deviation used in the calculation is based on a relatively small data set, usually seven replicates from one laboratory. Because of the extra care a laboratory will take with this procedure, an MDL is not likely to represent routine laboratory performance. The ML is also simple to calculate and widely used in regulatory programs, but because of its relation to the MDL, it has been criticized in a similar manner.

The LOD and LOQ are not used as often in regulatory programs. The LOD is similar to the MDL and the LOQ to the ML in calculation and in assuming that the standard deviation does not vary with concentration. The LOD and LOQ are based on the

population standard deviation, which is usually not known or would require a large number of samples to estimate.

The PQL is simple to calculate and widely used in regulatory programs. It is sensitive to concentration, whether it is based on the MDL or PE studies. Laboratories involved in PE studies usually are experienced and know they are being tested, so that a PQL based on these data are not likely to represent capabilities of ordinary laboratories working under routine conditions. PQLs based on PE studies may be too high if the study concentrations are much higher than quantitation levels. Many of the already published PQLs are often fixed values derived by consensus rather than specific laboratory studies.

The AML and IQE have been proposed as improvements to the USEPA's ML and PQL approaches. The AML is not sensitive to concentration because it defines the standard deviation as a function of concentration. It requires more calculation steps, but these calculations can be easily set up in a spreadsheet. The AML can incorporate variability from multiple analysts, instruments, and laboratories. It incorporates uncertainty in the calibration function relating instrument response to true concentration and uncertainty in the standard deviation.

The IQE method is intended to allow most laboratories, using a standard measurement system, to attain at reasonable cost the IQE quantification performance in routine analyses. The IQE should realistically include sources of bias and variation that are common to the measurement process (for example, instrument noise, differences in laboratories, analysts, sample preparation, and instruments). The IQE should realistically exclude avoidable sources of bias and variation (for example, modifications to the sample, analytical procedure, analytical equipment, and transcription errors). The IQE applies to methods for which calibration error is minor relative to other sources.

Terms Used in Other Programs

Besides water and wastewater, analytical detection and quantification terms are used in other regulatory programs. Those used in state programs are discussed in the next section, **State Policies**. Table 4 here lists terms found in federal regulations for air, solid waste and hazardous waste, and hazardous substances. No references to analytical detection or quantification terms were found in federal environmental statutes.

State Policies

Ten states were selected for review of their policies for analytical detection and quantification in their environmental programs: Alabama, California, Illinois, Louisiana, New Jersey, Ohio, Oklahoma, Pennsylvania, Texas, and Washington. An overview of the policies in these states as a group is provided first, followed by a more detailed discussion of each individual state's policies.

Table 3
Comparison of Detection and Quantification Terms

Term	Method of Calculation	Advantages	Disadvantages/Issues
Detection Levels			
MDL	3.143*s* (1)	Simple to calculate Widely used in regulatory programs	Value is sensitive to concentration level used in replicate analyses. Assumes standard deviation does not vary with concentration. Extra care taken with MDL samples not likely to represent routine laboratory performance. Standard deviation based on relatively small data set (seven replicates from one laboratory).
LOD	3σ	Simple to calculate	Assumes standard deviation does not vary with concentration. Based on standard deviation of population when usually only sample standard deviation is available. Not commonly used in regulatory programs.
Quantification Levels			
ML	10*s* 3.18 MDL Lowest calibration standard	Simple to calculate Widely used in regulatory programs	Value is sensitive to concentration level used in replicate analyses. Assumes standard deviation does not vary with concentration and is the same at the MDL as it is at the ML. Extra care taken with MDL samples not likely to represent routine laboratory performance. Not specifically designed to incorporate interlaboratory variability. Earlier promulgated MLs based on screening protocols or USEPA contract reporting levels, which may not represent current laboratory performance. Standard deviation based on relatively small data set (seven replicates from one laboratory). Because ML is a single point estimate, actual %RSD cannot be calculated and compared to data quality objectives.

Table 3 (continued)

Comparison of Detection and Quantification Terms

Term	Method of Calculation	Advantages	Disadvantages/Issues
LOQ	10σ	Simple to calculate Requires the %RSD to be relatively small (10%)	Assumes standard deviation does not vary with concentration. Based on standard deviation of population when usually only sample standard deviation is available. Not commonly used in regulatory programs.
PQL	5 to 10 times MDL Level which certain percentage of laboratories can achieve	Simple to calculate Widely used in regulatory programs	Value is sensitive to concentration level used in replicate analyses. Usually determined at single concentration. Laboratories involved in interlaboratory studies usually are experienced and know they are being tested; results are not likely to represent capabilities of ordinary laboratories working under routine conditions. PQLs based on USEPA performance evaluation (PE) studies may be too high if PE sample concentrations are much higher than quantitation levels. Published values are often fixed values derived by consensus rather than specific laboratory studies.
AML	Concentration at which the instrument response is 10*s* (2)	Not sensitive to concentration levels used in replicate analyses Can incorporate variability from multiple analysts, instruments, and laboratories Incorporates uncertainty in the calibration function relating instrument response to true concentration and uncertainty in the standard deviation at the AML Typically provides an %RSD around 10%	Requires more calculation steps, but can be set up for spreadsheet calculation. Standard deviation must be expressed as function of concentration.

Table 3 (continued)

Comparison of Detection and Quantification Terms

Term	Method of Calculation	Advantages	Disadvantages/Issues
IQE	The lowest concentration for which a single measurement from a laboratory in a group of qualified laboratories in an interlaboratory study will have an estimated Z% relative standard deviation, where Z is typically an integer multiple of 10, such as 10, 20, or 30.	Should allow most laboratories to attain the IQE quantitation performance in routine analyses, using a standard measurement system, at reasonable cost.	Not widely used.

s-Sample standard deviation
σ-Population standard deviation
%RSD-Percent relative standard deviation (100% x s/mean)
(1) The value of 3.143 is Student's t for seven replicate analyses.
(2) The standard deviation is a function of concentration. The actual calculation of the AML requires several additional steps, not shown here.

Overview

Table 5 lists detection and quantification terms used by the ten states. The most frequently used terms are detection limit/level, MDL, and PQL. ML is used by Alabama, California, Illinois, and Ohio. States vary in how much they incorporate these terms in their regulatory language. The extensive table in the Appendix lists excerpts from state regulations (and some water quality implementation procedures) where detection or quantification terms were found. Terms are listed alphabetically by state. Each entry provides the term used, the actual regulatory language referencing the term, regulatory citation, the type of environmental program to which the regulation relates, and use of the regulation (definition, wastewater permit limit/compliance, alternative limits, and other).

Every state includes detection or quantification terms in their regulations. Definitions of terms referenced in regulations are usually given in the regulations, but not always.

The states commonly set wastewater permit limits at or below detection or quantification levels, where necessary to protect water quality or include federal industrial effluent limits. Most states specify, either in their regulations or implementation procedures, how compliance is demonstrated in such cases. Compliance with a maximum concentration limit is demonstrated by a “less-than” analytical result (detection or quantification limit, as applicable). Where an average or mass load is calculated, most states specify that zero be used for less-than values. In some situations, one-half the detection limit must be used.

Table 4
Detection and Quantification Terms Used in Other Federal Programs

Program	Term	Definition	Reference
Air			
	Analytical uncertainty (AU)	Not given in regulation	40 *CFR* 63, Appendix A
	Detection limit	Not given in regulation	40 *CFR* 60, Appendix A
	Detection limit	The detection limit is the lowest concentration of an analyte for which its overall fractional uncertainty (OFU) is required to be less than its analytical uncertainty limit (AU).	40 *CFR* 63, Appendix A
	Instrumental detection limit	Not given in regulation	40 *CFR* 63, Appendix A
	Lower concentration limit	Not given in regulation	40 *CFR* 50, Appendix L
	Lower detection limit	Not given in regulation	40 *CFR* 50, Appendix L 40 *CFR* 60, Appendix A 40 *CFR* 63.145 40 *CFR* 63, Appendix A
	Minimum analytical uncertainty (MAU)	The MAU is the minimum analyte concentration for which the analytical uncertainty limit (AU) can be maintained.	40 *CFR* 63, Appendix A
	Minimum detection limit (MDL)	The minimum detection limit (MDL) is the minimum concentration or amount of an analyte that can be determined with a specified degree of confidence to be different from zero.	40 *CFR* 60, Appendix A
	Minimum detection limit (MDL)	Not given in regulation	40 *CFR* 63, Appendix A
	Practical lower detection limit	Not given in regulation	40 *CFR* 63, Appendix A
	Practical lower detection range	Quantitation limit	40 *CFR* 63, Appendix A
	Practical quantitation limit (PQL)	Not given in regulation	40 *CFR* 60, Appendix A
	Quantitation limit	The PQL is the lower limit of detection for the FTIR system configuration in the sample spectra. Since the noise in subtracted sample spectra may be much greater than in a zero absorbance spectrum, the quantitation limit is generally much higher than the sensitivity.	40 *CFR* 63, Appendix A
	Quantification limit	Not given in regulation.	40 *CFR* 63, Appendix A
	Sensitivity	The noise-limited compound-dependent detection limit for the FTIR system configuration. This is estimated by the MAU. It depends on the RMSD in an analytical region of a zero absorbance line.	40 *CFR* 63, Appendix A

Table 4 (continued)

Detection and Quantification Terms Used in Other Federal Programs

Program	Term	Definition	Reference
Solid Waste and Hazardous Waste			
	Analytical detection limit In-stack detection limit In-stack method detection limit Method detection limit	Not given in regulation	40 *CFR* 266, Appendix IX
	Minimum required detection limit	Not given in regulation	40 *CFR* 261.38, Table 1
	Practical quantitation limit (PQL)	The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.	40 *CFR* 257.23 40 *CFR* 258.53
	Practical quantitation limit (PQL)	Not given in regulation	40 *CFR* 261, Appendix IX 40 *CFR* 264.97
	Quantitation limit	Not given in regulation	40 *CFR* 261.24
Hazardous Substances			
	Contract-required detection limit (CRDL)	Equivalent to contract-required quantitation limit, but used primarily for inorganic substances.	40 *CFR* 300, Appendix A
	Contract-required quantitation limit (CRQL)	Substance-specific level that a laboratory in the contract laboratory program (CLP) must be able to routinely and reliably detect in specific sample matrices. It is not the lowest detectable level achievable, but rather the level that a CLP laboratory should reasonably quantify. The CRQL may or may not be equal to the quantitation limit of a given substance in a given sample. For hazard ranking system (HRS) purposes, the term CRQL refers to both the contract-required quantitation limit and the contract-required detection limit.	40 *CFR* 300, Appendix A
	Detection limit (DL)	Lowest amount that can be distinguished from the normal random "noise" of an analytical instrument or method. For HRS purposes, the detection limit used is the method detection limit (MDL) or, for real-time field instruments, the detection limit of the instrument as used in the field.	40 *CFR* 300, Appendix A

Table 4 (continued)
Detection and Quantification Terms Used in Other Federal Programs

Program	Term	Definition	Reference
	Method detection limit (MDL)	Lowest concentration of analyte that a method can detect reliably in either a sample or blank.	40 *CFR* 300, Appendix A
	Sample quantitation limit (SQL)	Quantity of a substance that can be reasonably quantified given the limits of detection for the methods of analysis and sample characteristics that may affect quantitation (for example, dilution, concentration).	40 *CFR* 300, Appendix A

Although states have procedures for allowing wastewater permittees to develop site-specific detection or quantification limits based on state or EPA defined methods (for example, the MDL procedure at 40 *CFR* 136), none of the states had specific procedures for developing or approving alternative methods (such as the AML or IQE). In fact, none of the state staff contacted for this review had personally encountered this situation. Staff indicated that approval of alternative methods would be on a case-by-case basis, and likely coordinated with the USEPA.

Alabama

Excerpts from state regulations that reference detection or quantification limits are included in the Appendix. A summary of these regulations is provided below.

Use of Terms

In its NPDES regulations for direct dischargers, the Alabama Department of Environmental Management (ADEM) uses the terms IML, MDL, and ML. In its groundwater and solid/hazardous waste programs, the ADEM uses the terms, DL, LOD, and PQL. In its pretreatment program, it refers to values less than the DL, but does not define the term.

Use in NPDES Permits and Compliance

The ADEM specifies in its wastewater regulations and permit language that less-than values will be treated as zeros in calculating discharge averages. For the purpose of reporting and compliance, permittees must use the ML as established by EPA. All analytical values at or above the ML must be reported as the measured value, and values below the ML must be reported as zero. For parameters without an EPA-established ML, IML, or matrix-specific ML, a less-than value constitutes compliance if the detection

Table 5
Summary of Analytical Detection and Quantitation Terms Used by States

State Programs	DL	IDL	IML	LOD	LOQ	MDL	ML	QL	PQL	Other
Alabama										
Groundwater Solid/hazardous waste	X			X					X	
Water quality*	X		X			X	X			
California										
Drinking water	X						X			DLR
Groundwater Solid/hazardous waste	X	X		X		X			X	
Health/safety				X						
Water quality*					X	X	X		X	
Illinois										
Drinking water	X					X			X	MQL
Groundwater Solid/hazardous waste	X			X		X			X	ADL EDL EQL MQL
Laboratories						X				
Pesticides	X					X				MQL
Water quality*	X			X	X	X	X	X		
Louisiana										
Air	X			X	X					
Groundwater Solid/hazardous waste	X			X				X	X	
Water quality*	X									LOM MQL**
New Jersey										
Drinking water						X				
Groundwater Solid/hazardous waste	X	X			X	X		X	X	CRDL
Laboratories	X	X				X				
Water quality*	X					X			X	NJQL LOD*
Ohio										
Air					X					
Drinking water	X					X				
Groundwater Solid/hazardous waste	X			X					X	ADL

Table 5 (continued)
Summary of Analytical Detection and Quantitation Terms Used by States

State Programs	DL	IDL	IML	LOD	LOQ	MDL	ML	QL	PQL	Other
Laboratories						X				
Underground Storage Tanks						X		X		
Water quality*						X	X	X	X	ADL
Oklahoma										
Air	X									ADL MLD MQL*
Drinking water									X	MDL*
Groundwater Solid/hazardous waste	X			X					X	
Water quality*										MQL*
Pennsylvania										
Air										
Drinking water						X			X	
Groundwater Solid/hazardous waste						X		X	X	EQL
Water quality*	X			X		X			X	
Texas										
Air	X									
Drinking water	X					X			X	
Groundwater Solid/hazardous waste	X			X		X			X	MQL SQL
Water quality*						X				MAL
Washington										
Air									X	
Drinking water	X									
Groundwater Solid/hazardous waste	X			X	X	X			X	
Water quality*	X					X			X	

Notes:
Water quality* - Includes water quality, NPDES, and pretreatment programs.

Key to acronyms:

ADL Analytical detection limit/level, acceptable detection limit
CRQL Contract required quantitation limit
DL Detection limit/level
DLR Detection limit for purpose of reporting

Table 5 (continued)
Summary of Analytical Detection and Quantitation Terms Used by States

EDL	Estimated detection limit
EQL	Estimated quantitation limit
IDL	Instrument detection limit
IML	Interim minimum level
NJQL	New Jersey quantitation level
LOD	Level/limit of detection
LOD*	Level of detectability
LOM	Limit of measurement
LOQ	Limit of quantitation/quantification
MAL	Minimum analytical level
MDL	Method detection limit/level
MDL*	Minimum detection limit
ML	Minimum limit
MLD	Minimum level of detectability
MQL	Method quantitation limit
MQL*	Minimum quantification level/limit
MQL**	Minimum analytical quantification level
PQL	Practical quantitation/quantification limit/level
QL	Quantification level
SQL	Sample quantitation limit

limit of all analytical methods is higher than the permit limit. If there are multiple analytical methods for a monitoring parameter, the permittee must use one having an ML lower than the permit limit. If all method MLs are higher than the permit limit, the permittee must use the one with the lowest ML, and a less-than value will constitute compliance and be reported as zero. Should EPA approve a method with a lower ML during the permit term, the permittee must use the new method. The ML must be reported on the permittee's discharge monitoring report (DMR).

For pretreatment permits for significant industrial dischargers (SIDs), analytical methods must have a detection limit less than the permit limit, or if there are none below the limit, the one with the lowest detection limit must be used.

Use of Alternative Limits and Procedures

The ADEM regulations specify that if there is no established ML (presumably meaning not promulgated), an interim ML equal to 3.18 times the MDL shall be used. Subject to approval by the ADEM, where an effluent matrix prevents attainment of the

established ML, NPDES permittees may develop an effluent matrix-specific ML. They may do so during permit issuance, reissuance, modification, or during a compliance schedule. With respect to alternative approaches to detection/quantification limits, ADEM staff stated that they had no specific approval procedures, and that they generally follow procedures at 40 *CFR* 136 (This was a general reference given by the staff; there are no approval procedures there).

California

Excerpts from state regulations that reference detection or quantification limits are included in the Appendix. A summary of these regulations is provided below.

Use of Terms

The California Environmental Protection Agency (CEPA) regulations refer to the following analytical detection/quantitation terms in the state's environmental programs: water quality—LOQ, MDL, and PQL; drinking water—DL, DLR (detection limit for purpose of reporting), and ML; groundwater, solid/hazardous water—DL, IDL, LOD, MDL, and PQL; and health and safety—LOD. The CEPA's implementation procedures for toxic pollutants (*Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California*) use the terms, MDL and ML.

Use in NPDES Permits and Compliance

Determining which priority pollutants require water quality-based effluent limits requires consideration of detection limits. If a pollutant is not detected in any of the effluent samples and any of the reported detection limits are below the water quality standard, the maximum effluent pollutant concentration (MEC) is set at the lowest detection limit (The MEC is not the permit limit, it is an estimate of the effluent concentration used in water quality limit calculations). If, after making adjustments in the permit calculations for factors such as pH, hardness, translators, and time-scales, the adjusted MEC is greater than the water quality standard, then a permit limit is required. If data are unavailable or insufficient to conduct such an analysis for a pollutant, or if all effluent detection limits are greater than the water quality standard, interim requirements for additional monitoring will be placed in the permit.

When effluent concentration allowances (ECA) are multiplied by variability factors to determine long-term average discharge conditions, the coefficient of variation (CV) incorporated in the factor will be set at 0.6 when at least 80% of the effluent data are reported as non-detects. Otherwise, the CV is calculated and any non-detects are given a value of one-half the detection limit.

If all receiving water samples are below detection limits, the maximum ambient background concentration is set to the lowest detection limit. If any sample has detected concentrations, the maximum ambient background concentration is set to the maximum

concentration. In calculating background averages, if all samples are below detection limits, the ambient background concentration is set to the lowest detection limit. If any sample has detected concentrations, the ambient background concentration is set to the mean, using detection limits for less-than values.

When there is more than one ML for a pollutant in a permit, the permit will list all analytical methods and their associated MLs that are below the permit limit. The permittee may select any one of the analytical methods for compliance determination. If no ML value is below the permit limit, the permit will require the analytical method with the lowest ML.

In DMRs, sample results less than the reported ML, but greater than or equal to the laboratory's MDL, are reported as "Detected, but Not Quantified" (DNQ). The estimated concentration must also be reported. The laboratory must write the estimated concentration next to DNQ as well as the words "Estimated Concentration." The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result (may be percent accuracy, numerical ranges (low to high), or any other means considered appropriate by the laboratory). Sample results less than the laboratory's MDL must be reported as "Not Detected" (ND).

Dischargers are considered out of compliance with a permit limit if the concentration is greater than the permit limit and greater than or equal to the ML. When determining compliance with a monthly average limit and more than one sample result is available in a month, the discharger uses the mean unless the data set contains one or more DNQ or ND results. In the latter case, the discharger calculates the median. If the monitoring result (single value or average) is below the ML, but there is evidence that the pollutant is present in the effluent above a permit limit, the discharger is not considered out of compliance if the discharger conducts a PMP (pollutant minimization program).

Use of Alternative Limits and Procedures

There are no specific procedures for approving alternative procedures for determining detection or quantification limits; however, the "Specials Studies" section in CEPA's implementation procedures could be used as guidance for such. The special studies process includes a workplan, data review by an independent scientific review panel (if necessary), compliance schedule, assessment of environmental and economic impacts, and review of antidegradation and other legal requirements.

Illinois

Excerpts from state regulations that reference detection or quantification limits are included in the Appendix. A summary of these regulations is provided below.

Use of Terms

The Illinois Environmental Protection Agency (IEPA) refers to the following analytical detection/quantitation terms in the state's environmental programs: water quality—DL, LOD, LOQ, MDL, ML, and QL; drinking water—DL, MDL, MQL (method quantitation limit), and PQL; groundwater, solid/hazardous water—ADL (acceptable detection limit), DL, EDL (estimated detection limit), EQL (estimated quantitation limit), LOD, MDL, MQL, and PQL; laboratory accreditation—MDL; and pesticides—DL, MDL, and MQL.

The IEPA water quality regulations include definitions of MDL, ML, and QL These same regulations use the terms, DL, LOD, and LOQ, but do not define them. The IEPA definitions of MDL and ML are the same as the USEPA definitions. The QL is equated to the ML, or lowest quantifiable level practicable. Although the IEPA defines MDL and ML, in the application of its water quality regulations, it primarily uses the term QL.

Use in NPDES Permits and Compliance

The IEPA NPDES regulations specify that LODs and LOQs will be considered in setting permit limits and background concentrations for total maximum daily loads (TMDLs) and wasteload allocations (WLAs). If all values in a background data set are below the detection limit, all values are assumed to be zero; otherwise, "commonly accepted" statistical techniques are to be used to calculate the geometric mean background concentration. Where permit limits are set below a detection limit, a less-than value constitutes compliance. For mass calculations, a zero is used for a less-than value. When calculating averages, one-half the detection limit is used for less-than values. In the pretreatment regulations, an alternative pretreatment limit for a categorical discharger cannot be used if it is below the analytical detection limit.

When a water quality based effluent limit (WQBEL) is less than the QL, a wastewater permit must include the WQBEL as calculated, must specify the most sensitive applicable analytical method, and the analytical method must be the method used for compliance assessment, including enforcement actions. The permit also must identify the QL that can be achieved. In determining the practicability of a method, the IEPA considers the ability of competent commercial laboratories to achieve the target detection level. The permit must include a requirement for a pollutant minimization program (PMP) for each pollutant with a WQBEL below the QL, unless the permittee demonstrates that an alternative technique is adequate to assess compliance with the WQBEL.

Use of Alternative Limits and Procedures

The IEPA will allow a higher QL because of effluent-specific matrix interference. Wastewater discharge permits can be modified to incorporate a new or alternative

analytical method or QL. The analytical procedure used for determining a QL must be a procedure published by the USEPA or nationally recognized organization; however, an alternative method may be allowed if scientifically defensible. IEPA staff stated that it had not encountered a request for an alternative procedure to derive detection/quantification limits. If such a case did occur, it would have the party submit a request to the department, including an explanation of why established procedures are not satisfactory. The request would probably be reviewed in cooperation with EPA.

Louisiana

Excerpts from state regulations that reference detection or quantification limits are included in the Appendix. A summary of these regulations is provided below.

Use of Terms

The Louisiana Department of Environmental Quality (LDEQ) includes only one quantitation level definition in its water quality regulations, a "limit of measurement" in its pretreatment program. This term is used only concerning removal credits where calculations with data sets containing values below the limit of measurement are specified. The term, DL, is referenced in the water quality regulations, but is not defined. In its implementation procedures, the LDEQ uses the term, minimum analytical quantification level (MQL). Detection and quantitation terms used in other programs include: groundwater, solid/hazardous water—DL, LOD, QL, and PQL; and air—DL, LOD, and LOQ.

Use in NPDES Permits and Compliance

In the LDEQ water quality regulations, if a constituent is prohibited in a discharge, it must be "absent" as determined by any analytical method. If a water quality criterion is below the detection limit, no detectable concentrations are allowed in the ambient water; however, for dilution calculations or water quality modeling used to develop TMDLs and WLAs, the assigned criteria, even if below the detection limit, will be used. In the pretreatment regulations, an alternative pretreatment limit for a categorical discharger cannot be used if it is below the analytical detection limit.

The LDEQ generally implements MQLs that are currently used by the USEPA Region VI for detection limits; however, these MQLs are subject to change. Using more sensitive analytical test methods, the LDEQ may impose an effluent-specific MQL lower than the listed MQL for discharges to receiving streams with known water quality problems or for discharges to receiving streams where numerical criteria may be exceeded. If the permit limit for any pollutant is less than the MQL, the LDEQ will use the MQL to determine compliance.

Use of Alternative Limits and Procedures

The permittee may develop an effluent specific MDL in accordance with Appendix B to 40 *CFR* Part 136. The permittee must send to the USEPA Region VI and the LDEQ a report containing quality assurance/quality control (QA/QC) documentation, analytical results, and calculations necessary to demonstrate that the effluent specific MDL was correctly calculated. An effluent specific MQL is calculated as 3.3 times the MDL. Upon written approval by the USEPA Region VI and the LDEQ, the permittee may use the effluent specific MQL for all DMR calculations and reporting requirements. The LDEQ has no specific procedures for approving alternative procedures for determining detection or quantification limits.

New Jersey

Excerpts from state regulations that reference detection or quantification limits are included in the Appendix. A summary of these regulations is provided below.

Use of Terms

The New Jersey Department of Environmental Protection (NJDEP) refers to the following analytical detection/quantitation terms in the state's environmental programs: water quality—DL, LOD (level of detectability), MDL, and PQL; drinking water—MDL; groundwater, solid/hazardous water—DL, IDL, LOQ, MDL, QL, PQL, and CRQL (contract required quantitation limit); and laboratory requirements—DL, IDL, and MDL. The NJDEP water quality regulations do not define DL, MDL, or PQL, although definitions of these terms are found in other regulations (for example, drinking water and laboratory requirements).

Use in NPDES Permits and Compliance

In calculating the "total pollutant load" for the purpose of setting fees, effluent parameters will be excluded if all analyses are non-detects (applies to volatile organic compounds, acid extractable compounds, base-neutral organic compounds, pesticides, and polychlorinated biphenyls (PCBs)). Otherwise, one-half the detection limit will be used in calculating the load. In the pretreatment regulations, an alternative pretreatment limit for a categorical discharger cannot be used if it is below the analytical detection limit.

In wastewater permitting, if an effluent limit is below the level of detectability, the NJDEP will set a limit of nondetectability in the permit. The reportable quantitation limit (RQL) is set at 5 times the MDL. The permittee is considered in compliance if

analyses are less than the RQL. When calculating averages or mass loads, one-half the detection limit is used for less-than values.

The NJDEP is in the process of reviewing its water quality regulations. Changes being considered include a definition of a "New Jersey Quantitation Level" (NJQL) and compliance with permit limits set below the quantitation level. The proposed NJQL is similar to the USEPA's definition of a PQL. Compliance with a permit limit set below the NJQL would be demonstrated if the analytical result were below the NJQL.

Use of Alternative Limits and Procedures

The NJDEP has no specific procedures for approving alternative procedures for determining detection or quantification limits. To obtain approval, NJDEP staff stated that the discharger would be required to demonstrate the need for an alternative procedure, and a review of its laboratory data would be required as part of that demonstration.

Ohio

Excerpts from state regulations that reference detection or quantification limits are included in the Appendix. A summary of these regulations is provided below.

Use of Terms

The Ohio Environmental Protection Agency (OEPA) has definitions in its water quality regulations for ADL (analytical detection limit), MDL, ML, PQL, and QL. The definitions of MDL and ML are consistent with the USEPA's. The PQL is defined as 5 times the MDL, but the OEPA may set an alternate PQL. The QL is set equal to the PQL, except for discharges to the Lake Erie basin, where it set equal to the ML (for those analytical methods that have MLs). Terms used in other programs include: air—LOQ; drinking water—DL and MDL; groundwater and solid/hazardous waste—ADL, DL, LOD, and PQL; laboratory requirements—MDL; and underground storage tanks—MDL and QL.

Use in NPDES Permits and Compliance

In determining WQBELs, OEPA specifies in its water quality regulations how it will handle data less than the analytical detection limit or PQL. For any discharge into the Lake Erie Basin where a WQBEL is below the QL, the permittee must have a pollutant minimization program. For compliance, if a permit limit is less than the QL, any value reported below the QL is considered compliant. For averages, zero is to be used for any data point less than the QL. Permittees may apply for discharge-specific QLs. If the QL

for an analytical procedure decreases, the permittee may be given a compliance schedule to demonstrate compliance using the new QL.

In determining background water quality where at least some data are above detection levels, when calculating the mean or median, values less than the detection level are replaced with one-half the detection level. If the detection level is not reported or available, the detection level for the most sensitive analytical method currently approved at 40 *CFR* 136, or other method detection level deemed acceptable by the director, is used. If all data are below detection levels, one-half of the detection level for the pollutant or one-half of the lowest water quality criterion, whichever is lower, is used as the background water quality if the pollutant is reasonably suspected of causing or contributing to the impairment or threatening of the designated use in the receiving water. Zero is used for the background concentration if default mixing assumptions are used and the pollutant is not suspected of causing impairment of the water body.

If all effluent analyses are below detection level, then the OEPA does not calculate a maximum and average PEQ (projected effluent quality), and a determination of WLAs will generally not be required. If there is at least one detected value, then the OEPA will normally determine the maximum and average PEQ. Monitoring is not recommended for any pollutant that did not require a WLA because all effluent analyses were below the analytical detection level.

If either total recoverable or dissolved metal concentrations on which a dissolved metal translator (DMT) measurement is based are less than the PQL, then the DMT measurement will not be used in determining the discharge-specific DMT unless the inaccuracies associated with concentrations less than PQL can be demonstrated to be insignificant or are accounted for through application of scientifically defensible conservative measures.

Use of Alternative Limits and Procedures

The OEPA may establish PQLs for a pollutant with a method listed at 40 *CFR* 136 or, if there is no 40 *CFR* 136 method, the OEPA may establish a PQL using an appropriate consensus standard or other generally accepted standard for the analytical method. If no such standard exists, the director may establish a PQL in the permit based on MDLs determined using the procedures in 40 *CFR* 136, Appendix B. The OPEA may establish a PQL on a basis different than 5 times the MDL if it is consistent with and no more stringent than the appropriate national consensus standard or other generally accepted standard. The OEPA has no specific procedures for obtaining approval of alternative procedures for determining detection or quantification procedures.

Oklahoma

Excerpts from state regulations that reference detection or quantification limits are included in the Appendix. A summary of these regulations is provided below.

Use of Terms

In the water quality regulations of the Oklahoma Department of Environmental Quality (ODEQ), only the quantitation term MQL (minimum quantification level) is referenced (but not defined). Terms used in other programs include: air—ADL (analytical detection limit), DL, MLD (minimum level of detectability), and MQL (minimum quantification limit); drinking water—MDL (minimum detection limit) and PQL; and groundwater and solid/hazardous waste—DL, LOD, and PQL.

Use in NPDES Permits and Compliance

In determining compliance with a water quality criterion, if sample values are below the MQL and the water quality criterion is above the MQL, nonparametric statistical measures are required. If sample values are below the MQL and the criterion is also below the MQL, 50% of the criterion value may be used.

Where the data used to characterize the effluent or upstream concentration and/or loading levels are reported as less than the MQL, zero will be used. Where data include measurable and less-than values, one-half the level of sensitivity will be used for the less-than values. If a pollutant is reported as nondetectable with a level of sensitivity above the MQL, the permit writer will assume that the pollutant is present at the level of sensitivity. An opportunity to perform additional analyses may be provided to confirm and quantify actual pollutant levels. In addition, data may be discarded if determined to be inappropriate, non-representative, or of inadequate quality.

Where calculated water quality-based limits are below the MQL, compliance will be based on the MQL. The calculated limit will be placed in the permit, and if any analytical test result for that pollutant is less than the MQL, zero may be used for DMR calculations and reporting. If a pollutant is of particular concern (for example, if the pollutant has a high bioconcentration factor) the permittee may also be required to develop an effluent-specific MDL. Additional requirements such as fish tissue collection and analyses, limits and/or monitoring requirements on internal waste streams, and limits and/or monitoring for surrogate parameters may also be required in the permit. Reductions in monitoring frequencies are not recommended in cases where a water quality-based limit is below the QL. Permittees will normally be considered in compliance when monitored levels are below the QL.

Use of Alternative Limits and Procedures

The ODEQ has no specific procedures for approving alternative procedures for determining detection or quantification limits.

Pennsylvania

Excerpts from state regulations that reference detection or quantification limits are included in the Appendix. A summary of these regulations is provided below.

Use of Terms

In its water quality regulations, the Pennsylvania Department of Environmental Protection (PDEP) uses the terms, DL, LOD, MDL, and PQL. The MDL definition is similar to EPA's; however, the PDEP adds that the MDL indicates "something is really there." In its other programs, the PDEP uses the following terms: drinking water—MDL and PQL; and groundwater and solid/hazardous waste—EQL (estimated quantitation limit), MDL, QL, and PQL.

Use in NPDES Permits and Compliance

The PDEP considers USEPA analytical test procedures when reviewing NPDES permit applications, and for establishing detection limits and methods of analysis in permits. For any pollutant with an effluent limit of "not detectable" the permittee generally is expected to achieve the detection limit of the most sensitive method. The words "Not Detectable" or ND will be given as the permit limit. In addition, the MDL for the required test method will be given together with a requirement that if the sensitivity of the sample measurement reported is less sensitive than the MDL, an explanation must be provided. If between two methods, the detection limit differs by less than 1 microgram per liter (μg/L) or a factor of 2, either method may be used.

Permittees generally are required to meet the detection limits set by the PDEP. An alternate analytical method may be used if the permittee is able to meet the level of detection of the selected method or the water quality-based limit. If a detection limit is not provided, the permittee is required to develop one using an MDL study. Monitoring results that are less-than values are reported as "less than" the stated value.

In the pretreatment regulations, an alternative pretreatment limit for a categorical discharger cannot be used if it is below the analytical detection limit.

Use of Alternative Limits and Procedures

The primary source for detection limits used by the PDEP is the USEPA MDL studies. Where the USEPA has not performed an MDL study or reported the detection limit, other sources, particularly *Standard Methods* (*Standard Methods for the Examination of Water and Wastewater,* 20th Edition, American Public Health Association, American Water Works Association, Water Environment Federation, Washington, DC, 1998) are consulted. When there is no literature or detection limit, the PDEP may ask its Bureau of Laboratories to determine the detection limit based on an

MDL study. Detection limits may be based on other criteria, such as instrument signal-to-noise ratios. The PDEP regulations state that detection limits for metals are generally instrument detection limits.

If an NPDES permittee cannot meet a listed detection limit, the PDEP may grant a case-specific MDL if a matrix effect is demonstrated. Permittees are required to follow the MDL procedure at 40 *CFR* Part 136, Appendix B.

The PDEP has no specific procedures for approving alternative procedures for determining detection or quantification limits.

Texas

Excerpts from state regulations that reference detection or quantification limits are included in the Appendix. A summary of these regulations is provided below.

Use of Terms

The Texas Natural Resource Conservation Commission (TNRCC) uses the terms, MDL and MAL (minimum analytical level), in its water quality regulations. The MAL is a state-defined term analogous to the USEPA's ML. Both the MDL and MAL are defined in the TNRCC's water quality regulations and discussed in its implementation procedures for water quality standards. The TNRCC regulations state that the MAL is not the published method detection limit for an EPA-approved analytical method (which is based on analysis in reagent (distilled) water), rather that the MAL is based on analyses in the matrix of concern (that is, wastewater effluents). When a matrix-specific MAL is not available, the TNRCC uses the generally applicable MAL it has established.

Terms used in other programs include: air—DL; drinking water—DL, MDL, and PQL; and groundwater and solid/hazardous waste—DL, LOD, MDL, MQL (method quantitation limit), PQL, and SQL (sample quantitation limit).

Use in NPDES Permits and Compliance

In setting permit limits, the TNRCC begins by considering quantitation levels in the permit application. Reporting levels for laboratory analyses submitted with wastewater applications must be at least as low as the MALs. When deciding whether to set a permit limit for a toxic pollutant, effluent average concentrations are compared to water quality standards. If all analyses are less than or equal to the MAL, zero is taken as the average. If any of the analyses are quantifiable, then one-half the MAL or reported level (whichever is less) is used in the calculation for any less-than values.

A permit limit may be set below the MAL; however, compliance is based upon the MAL. An exception is when the substance is of particular concern, for example, if it has

a high bioconcentration factor. In such a case, the TNRCC requires the permittee to develop a site-specific MDL and when there are effluent matrix problems, the permittee may develop an alternative site-specific MAL. An alternate MAL may also be developed anytime that existing analytical methods cannot resolve interference and matrix problems.

The TNRCC's NPDES permit language states that test methods to determine compliance with permit limits must be sensitive enough to achieve the MAL. When an analysis of the effluent sample is less than the MAL, the result must be reported as "<(MAL value)," and this is interpreted as a value of zero for compliance purposes. For discharge monitoring reports (DMRs), when calculating averages, any analytical value below the MAL is considered a zero.

Use of Alternative Limits and Procedures

The TRNCC has published MALs for general usage; however, NPDES permittees are allowed to develop matrix-specific MALs. If a permittee cannot attain a MAL and has tried all available techniques to solve interference and matrix problems, the permittee may request an opportunity to demonstrate an alternative site-specific MAL for the effluent. The permittee may apply for an alternate MAL through the alternate analytical test method procedure provided that all documentation of attempted solutions to the interference/matrix problems is included with the permit application. This documentation must include all QA/QC data.

The TNRCC has a process for approving site-specific MALs or MALs developed from alternative test methods. After reviewing the documentation provided by the TPDES permittee, the TNRCC issues a written decision. If the request is approved, the change will be implemented in the TPDES permit. The TNRCC intends to publish written procedures for this process.

Washington

Excerpts from state regulations that reference detection or quantification limits are included in the Appendix. A summary of these regulations is provided below.

Use of Terms

In its water quality regulations, the Washington State Department of Ecology (WSDE) uses the terms, DL, MDL, and PQL. In its other programs, the WSDE uses the following terms: air—PQL; drinking water—DL; and groundwater and solid/hazardous waste—DL, LOD, LOQ, MDL, and PQL.

Use in NPDES Permits and Compliance

For demonstrating compliance, WSDE regulations state that analytical results below the MDL are set to one-half the MDL. Results between the MDL and PQL are generally set equal to the MDL. When values must be summed for a group of chemicals or isomers, if analytical results are undetected values for every individual compound/isomer, then the single highest detection limit represents the sum of the respective compounds/isomers. Where analyses detect one or more individual compounds/isomers, only the detected concentrations are added to represent the group sum. In compliance with water quality standards, where a sediment sample indicates that a chemical is not detected, the detection limit must be reported and must not exceed the marine sediment quality criterion.

WSDE implementation procedures have different reporting procedures. In the case where a permit limit falls between the MDL and QL, compliance is evaluated by comparison with the QL. Measurements below the QL may be in compliance, and measurements in this range will not support enforcement of daily maximum limits. When calculating averages, all measures at or above the MDL should be used and all data below the MDL should be counted as zero. In the case where the effluent limit is less than both the MDL and QL, if the compliance measurement is below the QL, the sample may be in compliance, and enforcement actions are not taken. When calculating averages, all measures at or above the MDL should be used and all data below the MDL should be counted as zero.

Use of Alternative Limits and Procedures

A discharger may be allowed to develop a matrix-specific QL if the discharger can show that problems attaining the MDL are due to matrix effects and not to poor laboratory performance.

WSDE staff stated that it had not encountered a request for an alternative procedure to derive detection/quantification limits. If such a case did occur, it would have the party submit a request to the department. The request would probably be reviewed in cooperation with EPA.

Recommendations for Compliance Monitoring

Wastewater permittees can take several steps to ensure that permit limits involving detection or quantification issues do not cause compliance monitoring problems. Permittees should take an active role during the permitting process, beginning with the permit application.

Permittees should make sure that all required effluent analyses in the permit application meet the permitting agency's minimum analytical levels. The agency will use these levels when it assesses whether the discharge has the potential to violate water

quality standards for toxic pollutants. If a permittee reports a less-than value higher than the minimum analytical level and higher than the water quality standard, the agency may conclude that there is a potential to exceed the standard and place either a permit limit or monitoring-only requirement in the permit.

Permittees should know in advance of the permit application if their effluent has matrix effects that will require higher detection and quantification limits. The permittee should provide the necessary documentation to the permitting agency that demonstrates the need for a higher limit. This documentation should be provided during the permitting process. Options for dealing with matrix effects may include a different analytical method, a modification of analytical method procedures, site-specific detection and quantification limits, or an alternative procedure for developing detection and quantification limits.

The permittee should carefully review the draft permit and provide written comments when changes are necessary. For any pollutants that have proposed permit limits below detection or quantification limits, the permittee should ensure that the permit describes how compliance is determined. Any reporting and calculation procedures should describe how nondetect or less-than values are handled (for example, reported as less-than, equated to zero or one-half the detect/quantification limit), and these procedures should be consistent with the agency's implementation procedures and regulations.

After the permit is finalized, the permittee should ensure that its discharge data are being interpreted and recorded properly at the permitting agency. For example, if a daily maximum value is reported as "< X," the agency's records should reflect the less-than sign.

Appendix

List of State Regulations
Citing Detection/Quantification Terms

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
Alabama								
	Detection limit	When an EPA approved method having a detection limit lower than the permit limitation or when the EPA approved method having the lowest detection limit for a substance is used by the permittee, a value of less than detectable shall be considered zero for purposes of calculating the average monthly discharge of the substance.	COA 335-6-5-.02(b) (NPDES)			X		
	Detection limit	When an EPA approved method having a detection limit lower than the permit limitation or when the EPA approved method having the lowest detection limit for a substance is used by the permittee, a value of less than detectable shall be considered zero for purposes of calculating the average weekly discharge of the substance.	COA 335-6-5-.02(c) (NPDES)			X		
	Detection limit	When more than one approved test method exists for a substance limited in the SID Permit, the SID Permit shall require the use of a method having a detection limit below the permit limit for the substance or, when no method has a detection limit as low as the permit limit, the SID Permit shall require the use of a method having the lowest detection limit.	COA 335-6-5-.16(9) (pretreatment)		X			
	Detection limit	Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean (zero discharge days shall not be used in these calculations) unless otherwise specified by the Director in the permit.	COA 335-6-6-.12(k)(1)(5)(iv) (NPDES)			X		
	Detection limit	Constituent specifications. For compounds listed in Table 1 of 335-14-2-.04(9) the specification levels and, where non-detect is the specification, minimum required detection limits are as listed in Table 1.	COA 335-14-2-.04(9)(a)(2) (hazardous waste)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Interim minimum level	Calculated when a method-specific minimum level does not exist. It is equal to 3.18 times the method-specified method detection limit.	COA 335-6-6-.02(w) (NPDES)	X				
	Interim minimum level	For pollutant parameters without an established ML, an interim ML shall be utilized. The interim ML shall be calculated as 3.18 times the Method Detection Level (MDL) calculated pursuant to 40 CFR Part 136 (1994), Appendix B.	COA 335-6-6-.15(12)(b) (NPDES)	X				
	Limit of detection	The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment.	COA 335-13-4-.27(2)(m)(5) COA 335-14-5-.06(8)(i)(5) (groundwater)					X
	Method detection limit	The minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero as determined by a specific laboratory method (40 CFR Part 136) (1994).	COA 335-6-6-.02(z) (NPDES)	X				
	Method detection limit	The interim ML shall be calculated as 3.18 times the Method Detection Level (MDL) calculated pursuant to 40 CFR Part 136 (1994), Appendix B.	COA 335-6-6-.15(12)(b) (NPDES)	X				
	Minimum level	Average monthly discharge limitation. When an EPA approved method is used by the permittee, a value of less than the Minimum Level (ML) shall be considered zero for purposes of calculating the average monthly discharge of the substance.	COA 335-6-6-.02(c) (NPDES)		X			
	Minimum level	Average weekly discharge limitation. When an EPA approved method is used by the permittee, a value of less than the Minimum Level (ML) shall be considered zero for purposes of calculating the average weekly discharge of the substance.	COA 335-6-6-.02(d) (NPDES)		X			

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Minimum level	The concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The minimum level is the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes, and processing steps have been followed.	COA 335-6-6-.02(aa) (NPDES)	X				
	Minimum level	For the purpose of reporting and compliance, permittees shall use the Minimum Level (ML) as established by EPA. All analytical values at or above the ML shall be reported as the measured value. Values below the ML shall be reported as "0."	COA 335-6-6-.15(12)(a) (NPDES)		X			
	Minimum level	For pollutant parameters without an established ML, an interim ML shall be utilized.	COA 335-6-6-.15(12)(b) (NPDES)					X
	Minimum level	Permittees may develop an effluent matrix-specific ML, where an effluent matrix prevents attainment of the established ML. However, a matrix specific ML shall be based upon proper laboratory method and technique. Matrix-specific MLs must be approved by the Department, and may be developed by the permittee during permit issuance, reissuance, modification, or during a compliance schedule.	COA 335-6-6-.15(12)(d) (NPDES)				X	
	Practical quantification limit	Where practical quantification limits (pqls) are used in any of the following statistical procedures to comply with 335-14-5-.06(8)(i)5., the pql must be proposed by the owner or operator and approved by the Department.	COA 335-14-5-.06(8)(h) (groundwater)				X	
	Practical quantification limit	Any practical quantification limit (pql) approved by the Department under 335-14-5-.06(8)(h) that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility	COA 335-14-5-.06(8)(i)(5) (groundwater)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	Any practical quantitation limit (pql) that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.	COA 335-13-4-.27(2)(m)(5) (groundwater)	X				
	Practical quantitation limit	PQLs are the lowest concentrations of analytes in groundwaters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. PQLs are based on 5 mL samples for volatile organics and 1 L samples for semivolatile organics. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.	COA 335-13-4-Appendix II (solid waste)	X				
	Practical quantitation limit	Practical quantitation limits (PQLs) are the lowest concentrations of analytes in groundwaters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.	COA 335-14-5-Appendix IX (hazardous waste)	X				
California								
	Detection limit	Detection limit for the purposes of reporting (DLR) means the designated minimum level at or above which any analytical findings of a contaminant in drinking water resulting from monitoring required under this chapter shall be reported to the Department.	CCR 22-64400.45, 64671.15 (drinking water)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection limit	A water system is deemed to have optimized corrosion control if it submits results of tap water monitoring...that demonstrate for two consecutive six month monitoring periods that the difference between the 90th percentile tap water lead level...and the highest source water lead concentration, is less than the detection limit for purposes of reporting in Section 64672(b).	CCR 22-64673(b)(3) (drinking water)			X		
	Detection limit	Until new guidance or standards are developed, the owner or operator may demonstrate such good-faith efforts by achieving a detection limit for the constituent that does not exceed an order of magnitude above the level provided by section 66268.43 for F039 nonwastewaters...	CCR 22-66266.112(b)(2)(A) (hazardous waste)			X		
	Detection limit	For wastes with organic constituents having treatment standards expressed as concentration levels, if compliance with the treatment standards is based in whole or in part on the analytical detection limit alternative specified in section 66268.40(d), the certification, signed by an authorized representative, shall state the following...	CCR 22-66268.7(b)(4)(C) (hazardous waste)			X		
	Instrument detection limit	The instrument detection limit (IDL) was determined by the analysis of eleven replicates, blanks, and standards. The IDL was based on three times the standard deviation…	CCR 22-66261.126, Appendix XI, 11.2 (hazardous waste)	X				
	Limit of detection	Using a predefined level of confidence, this is the lowest measured value at which some of the measured material is likely to have come from the sample.	CCR 8–5207, Appendix F, 2.0 (health and safety)	X				
	Limit of detection	Defined as "Sensitivity."	CCR 8–5207, Appendix F, 2.0 (health and safety)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Limit of detection	In a laboratory QA/QC program, the values of the standards must exceed the values obtained for compliance samples such that the lowest standard value is near the limit of detection and the highest standard is higher than the highest compliance sample or QC sample.	CCR 8-5207, Appendix F, 2.0 (health and safety)			X		
	Limit of detection	Another data quality criterion required to properly evaluate measurement results is the limit of detection of that measurement. For measurements to be useful, the range of the measurement, which is of interest for biological monitoring purposes, must lie entirely above the limit of detection defined for that measurement.	CCR 8-5207, Appendix F, 4.5 (health and safety)			X		
	Limit of detection	However, only the most recent techniques are capable of satisfying the required accuracy, precision, and sensitivity (i.e.., limit of detection) for monitoring at the levels mandated in the final cadmium rule, while still facilitating automated analysis and rapid processing.	CCR 8-5207, Appendix F, 5.0 (health and safety)			X		
	Limit of detection	This limit of detection was defined as 3 times the standard deviation calculated from 10 repeated measurements of a "low level" CDU test sample.	CCR 8-5207, Appendix F, 5.2.8.2 (health and safety)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Limit of detection	For the purpose of determining the performance of an organic destruction or removal process in accordance with the conditions in each of subsections (c) (2) (A) through (c) (2) (F) of this section, the owner or operator shall account for VO concentrations determined to be below the limit of detection of the analytical method by using the following VO concentration: If Method 25D in 40 CFR part 60, appendix A is used for the analysis, one half the blank value determined in the method at section 4.4 of Method 25D in 40 CFR part 60, appendix A, or a value of 25 ppmw, whichever is less. If any other analytical method is used, one-half the sum of the limits of detection established for each organic constituent in the waste that has a Henry's law constant value at least 0.1 mole-fraction-in-the-gas-phase/mole-fraction-in-the-liquid-phase (0.1. Y/X) [which can also be expressed as 1.8 _ 10-6 atmospheres/gram-mole/m31 at 25 degrees Celsius.	CCR 22-66264.1082(c)(2)(I) CCR 22-66265.1083(c)(2)(I) (hazardous waste)			X		
	Limit of detection	For the purpose of determining Ci, for individual waste samples analyzed in accordance with subsection (a)(3)(C) of this section, the owner or operator shall account for VO concentrations determined to be below the limit of detection of the analytical method by using the following VO concentration: If Method 25D in 40 CFR part 60, Appendix A is used for the analysis, one-half the blank value determined in the method at section 4.4 of Method 25D in 40 CFR part 60, appendix A. If any other analytical method is used, one-half the sum of the limits of detection established for each organic constituent in the waste that has a Henry's law constant values at least 0.1 mole-fraction-in-the-gas-phase/mole-fraction-in-the-liquid-phase (0.1 Y/X) [which can also be expressed as 1.8 _ 10-6 atmospheres/gram-mole/m3] at 25 degrees Celsius.	CCR 22-66265.1084(3)(D)(2) (hazardous waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Limit of quantitation	The revisions to regulatory provisions in the basin plan adopted by the San Francisco Bay Regional Water Quality Control Board...are summarized as follows:...Defines "method detection limits," "practical quantitation levels," and "limits of quantification" and clarifies that these will be considered in determining compliance with effluent limitations	CCR 23-3912(k)(2)(D) (water quality)	X		X		
	Method detection limit	Analyze a method blank along with each batch of ten samples (or less). If the blank indicates a significant contamination (more than twice the method detection limit), repeat all procedures with samples and blank.	CCR 22-66261.125, Appendix XI, 10.1 (hazardous waste)					X
	Method detection limit	The revisions to regulatory provisions in the basin plan adopted by the San Francisco Bay Regional Water Quality Control Board...are summarized as follows:...Defines "method detection limits," "practical quantitation levels," and "limits of quantification" and clarifies that these will be considered in determining compliance with effluent limitations	CCR 23-3912(k)(2)(D) (water quality)	X		X		
	Minimum level	Detection limit for the purposes of reporting (DLR) means the designated minimum level at or above which any analytical findings of a contaminant in drinking water resulting from monitoring required under this chapter shall be reported to the Department.	CCR 22-64400.45, 64671.15 (drinking water)	X		X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantification/ quantitation limit	The statistical method shall account for data below the practical quantification/quantitation limit with one or more statistical procedures that are protective of human health and the environment. Any practical quantitation limit that is used in the statistical method shall be the lowest concentration (or value) that can be reliably achieved within limits of precision and accuracy specified in the water quality sampling and analysis plan for routine laboratory operating conditions that are available to the facility. The owner or operator shall consider the practical quantification/quantitation limits listed in Appendix IX to chapter 14 for guidance purposes when specifying limits of precision and accuracy in the water quality sampling and analysis plan.	CCR 22-66265.97 (groundwater)	X		X		
	Practical quantification limit	The revised Water Quality Control Plan for the Santa Ana Region, as adopted March 11, 1994, by the Santa Ana Regional Water Quality Control Board includes the regulatory provisions summarized below:...Waste Discharge Permits: define "Practical Quantification Level"; provide for use of Practical Quantification Levels in establishing waste discharge limits.	CCR 23-3971(j) (NPDES)	X	X			
	Practical quantitation limit	Where practical quantitation limits are used in any of the following statistical methods to comply with subsection (c)(9)(E) of this section, the practical quantitation limit shall be proposed by the owner or operator for approval by the Department.	CCR 22-66264.97(e)(7) (groundwater)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in groundwaters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.	CCR 22-Appendix V (groundwater)	X				
	Practical quantitation limit	Where practical quantitation limits are used in any of the following statistical methods to comply with subsection (e)(9)(E) of this section, the practical quantitation limit shall be proposed by the discharger for approval by the regional board.	CCR 23-2550.7(e)(7) (groundwater)			X		
	Practical quantitation limit	The statistical method shall account for data below the practical quantitation limit with one or more statistical procedures that are protective of human health and the environment. Any practical quantitation limit approved by the regional board pursuant to subsection (e)(7) of this section that is used in the statistical method shall be the lowest concentration (or value) that can be reliably achieved within limits of precision and accuracy specified in the waste discharge requirements for routine laboratory operating conditions that are available to the facility. The regional board shall consider the practical quantitation limits listed in Appendix IX to Chapter 14 of Division 4.5 of Title 22, California Code of Regulations (Appendix IX) for guidance when specifying limits of precision and accuracy in the waste discharge requirements;	CCR 23-2550.7(e)(9)(E) (groundwater)	X		X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	The revisions to regulatory provisions in the basin plan adopted by the San Francisco Bay Regional Water Quality Control Board...are summarized as follows:...Defines "method detection limits," "practical quantitation levels," and "limits of quantification" and clarifies that these will be considered in determining compliance with effluent limitations	CCR 23-3912(k)(2)(D) (groundwater)	X		X		
	Practical quantitation limit	Where practical quantitation limits (PQLs) are used in any of the following data analysis methods to comply with (e)(9)(E), the discharger shall identify the PQL to the RWQCB.	CCR 27-20415(e)(7) (groundwater)			X		
	Practical quantitation limit	Addressing Censored Data—the statistical method shall account for data below the practical quantitation limit with one or more statistical procedures that are protective of human health and the environment. Any practical quantitation limit validated pursuant to (e)(7) that is used in the statistical method shall be the lowest concentration (or value) that can be reliably achieved within limits of precision and accuracy specified in the WDRs for routine laboratory operating conditions that are available to the facility. The discharger's technical report, under (e)(7) shall consider the practical quantitation limits listed in Appendix IX to Chapter 14 of Division 4.5 of Title 22, California Code of Regulations (Appendix IX) for guidance when specifying limits of precision and accuracy in the WDRs;	CCR 27-20415(e)(9)(E) (groundwater)	X		X		
Illinois								
	Acceptable detection limit	ADL" means Acceptable Detection Limit, which is the detectable concentration of a substance which is equal to the lowest appropriate Practical Quantitation Limit (PQL)…	35 IAC 742.200 (solid waste)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection level	The representative background concentration of pollutants to develop TMDLs and WLAs calculated in the absence of a TMDL shall be established as follows: When determining what available data are acceptable for use in calculating background, the Agency shall use its best professional judgment, including consideration of the sampling location and the reliability of the data through comparison, in part, to detection and quantification levels.	35 IAC 309.141(h)(6)(B)(ii) (NPDES)					X
	Detection level	The representative background concentration of pollutants to develop TMDLs and WLAs calculated in the absence of a TMDL shall be established as follows: When determining the geometric mean of the data for a pollutant that includes values both above and below the detection level, commonly accepted statistical techniques shall be used to evaluate the data. If all of the acceptable data in a data set are below the detection level for a pollutant, then all the data for the pollutant in that data set shall be assumed to be zero.	35 IAC 309.141(h)(6)(B)(iii) (NPDES)					X
	Detection level	In determining the practicability of a method, the Agency shall consider achievability of the identified detection level by competent commercial laboratories.	35 IAC 352.700(a) (NPDES)					X
	Detection limit	The laboratory results must be evaluated to determine the mean concentration and standard deviation of the sample. The value of the concentration reported as present but below detection limit will be used in the calculations. A value of zero will be used for results that are reported as non-detectable	8 IAC 258, Appendix C (pesticides)			X		
	Detection limit	An alternative pretreatment limit shall not be used if the alternative limit is below the analytical detection limit for any of the regulated pollutants.	35 IAC 310.233(b) (NPDES)		X			

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection limit	The "method detection limit" is different from the "detection limit", as set forth in Section 611.600.	35 IAC 611.609(a)(3) (drinking water)		X			
	Detection limit	The use of the term "detect" in this section is not intended to include any analytical capability of quantifying lower levels of any contaminant, or the "method detection limit". Note, however that certain language at the end of federal paragraph (f)(20) is capable of meaning that the "method detection limit" is used to derive the "detection limit".	35 IAC 611.646(a) (drinking water)	X				
	Detection limit	Any samples below the detection limit shall be deemed as zero for purposes of determining the annual average.	35 IAC 611.646(o)(1)(C) 35 IAC 611.648(k)(1)(C) (drinking water)			X		
	Detection limit	For the purpose of monitoring ..., the required sensitivity of the radioanalysis is defined in terms of a detection limit. The detection limit must be that concentration which can be counted with a precision of plus or minus 100 percent at the 95 percent confidence level (1.96 sigma where sigma is the standard deviation of the net counting rate of the sample).	35 IAC 611.720(c) (drinking water)	X		X		
	Detection limit	For wastes with organic constituents having treatment standards expressed as concentration levels, if compliance with the treatment standards is based in part or in whole on the analytical detection limit alternative specified in Section 728.140(d), the certification must be signed by an authorized representative and must state the following...	35 IAC 728.107(b)(4)(C) (hazardous waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection limit	When averaging under this Section, if no more than 50% of sample results are reported as "non-detect", "no contamination", "below detection limits", or similar terms, such results shall be included in the averaging calculation as one-half of the reported analytical detection limit for the contaminant. If more than 50% of sample results are "non-detect", another statistically valid procedure approved by the Agency may be used to determine an average.	35 IAC 742.225(e) (solid waste)			X		
	Detection limit	If more than 15% of the groundwater sampling results for a chemical obtained in accordance with subsection (a) of this Section are less than the appropriate detection limit for that chemical, the Prescriptive Approach may not be used for that chemical. If 15% or less of the sampling results are less than the appropriate detection limit, a concentration equal to one-half the detection limit shall be used for that chemical in the calculations contained in the Prescriptive Approach.	35 IAC 742.410(b)(1)(A) (groundwater)			X		
	Detection limit	The statistical analysis shall include, but not be limited to, the accounting of data below the detection limit of the analytical method used, the establishment of background concentrations and the determination of whether statistically significant changes have occurred in...	35 IAC 811.320(e)(1) 35 IAC 817.416(e)(1) (groundwater)			X		
	Estimated detection limit	For filtered water samples, PQL also means the Method Detection Limit or Estimated Detection Limit...	35 IAC 740.120 (hazardous waste) 35 IAC 742.200 (solid waste)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Estimated quantitation limit	Practical quantitation limit or "PQL" or "Estimated quantitation limit" means the lowest concentration that can be reliably measured within specified limits of precision and accuracy for a specific laboratory analytical method during routine laboratory operating conditions in accordance with "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," EPA Publication No. SW-846...	35 IAC 740.120 (hazardous waste) 35 IAC 742.200 (solid waste)	X				
	Level of detection	Total Maximum Daily Loads (TMDLs) and Waste Load Allocation (WLA) will be established through either the LaMP or a RAP for an Area of Concern. If a LaMP of RAP has not been completed and adopted, effluent limits shall be established consistent with the other provisions of this Section, including, but not limited to, Additivity, Intake Pollutants, Loading Limits, Level of Detection/Level of Quantification and Compliance Schedules.	35 IAC 309.141(h)(1) 35 IAC 352.200(d) (NPDES)		X			
	Level of detection	The concentration of each nonmetal toxic constituent of concern...in the waste-derived residue must not exceed the health-based levels...or the level of detection..., whichever is higher. If a health-based limit for a constituent of concern is not listed in Appendix G, then a limit of 0.002 ug/kg or the level of detection..., whichever is higher, must be used. The levels specified in Section 726.Appendix G (and the default level of 0.002 ug/kg or the level of detection for constituents, as identified in Note 1 of Section 726.Appendix G) are administratively stayed under the condition, for those constituents specified in subsection (b)(1) above, that the owner or operator complies with alternative levels defined as the land disposal restriction limits specified in 35 Ill. Adm. Code 728.143 and 728.Table B for F039 nonwastewaters.	35 IAC 726.212(b)(2)(A) (hazardous waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Level of detection	Monitored data that are below the level of detection shall be reported as not detected (ND). The level of detection for each constituent shall be the minimum concentration of that constituent which can be measured and reported with 99 percent confidence that the true value is greater than zero, which is defined as the method detection limit (MDL)....	35 IAC 811.320(e)(3) 35 IAC 817.416(e)(3) (groundwater)	X		X		
	Level of quantification	Total Maximum Daily Loads (TMDLs) and Waste Load Allocation (WLA) will be established through either the LaMP or a RAP for an Area of Concern. If a LaMP of RAP has not been completed and adopted, effluent limits shall be established consistent with the other provisions of this Section, including, but not limited to, Additivity, Intake Pollutants, Loading Limits, Level of Detection/Level of Quantification and Compliance Schedules.	35 IAC 309.141(h)(1) 35 IAC 352.200(d) (NPDES)		X			
	Limit of detection	The statistical method must account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment.	35 IAC 724.197(i)(5) (groundwater)			X		
	Limit of detection	For the purpose of determining the performance of an organic destruction or removal process in accordance with the conditions in each of subsections (c)(2)(A) through (c)(2)(F) of this Section, the owner or operator shall account for VO concentrations determined to be below the limit of detection of the analytical method by using the following VO concentration:	35 IAC 724.982(c)(2)(I) 35 IAC 725.983(c)(2)(I) (hazardous waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Limit of detection	For the purpose of determining Ci, for individual waste samples analyzed in accordance with subsection (a)(3)(C) of this Section, the owner or operator shall account for VO concentrations determined to be below the limit of detection of the analytical method by using the VO concentration determined according to subsection (a)(3)(G) of this Section.	35 IAC 725.984(a)(3)(D)(ii) (hazardous waste)			X		
	Limit of detection	VO concentrations below the limit of detection must be considered to be as follows: If Method 25D in 40 CFR 60, appendix A...is used for the analysis, the VO concentration must be considered to be one-half the blank value determined in the method at Section 4.4 of Method 25D in 40 CFR 60, appendix A. If any other analytical method is used, the VO concentration must be considered to be one-half the sum of the limits of detection established for each organic constituent in the waste that has a Henry's law constant value at least 0.1 mole-fraction-in-the-gas-phase/mole-fraction-in-the-liquid-phase (0.1 Y/X) (which can also be expressed as 1.8 x 10(-6) atmosphere/gram -mole/m(3)) at 25 °C.	35 IAC 725.984(a)(3)(G)(ii) (hazardous waste)			X		
	Method detection level	The minimum concentration of an analyte (substance) that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero as determined by the procedure set forth in Appendix B of 40 CFR 136.	35 IAC 301.311 (water quality)	X				
	Method detection limit	Method Detection Limit or MDL, which means the minimum concentration of a substance that can be measured as reported with 99 percent confidence that the true value is greater than zero pursuant to 56 Fed. Reg. 3526 thru 3597 (January 30, 1991).	8 IAC 257.10 (groundwater)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	Method Detection Limit or MDL, which means the minimum concentration of a substance that can be measured as reported with 99% confidence that the true value is greater than zero pursuant to 40 CFR 136, Appendix B (July 1997	8 IAC 258.30 (pesticides)	X				
	Method detection limit	Method detection limit (MDL)" means 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 type containing the analyte. Unless specified by the approved test method, the method detection limit shall be determined using the procedures specified in Section 186.160 of this Part.	35 IAC 186.120 (lab accreditation)	X				
	Method detection limit	Laboratories seeking initial accreditation additionally must submit:...the most recent method detection limit (MDL) study for each analyte and approved test method for which the laboratory is seeking accreditation, pursuant to Section 186.160 of this Part...	35 IAC 186.125(d)(2)(B) (lab accreditation)					X
	Method detection limit	The laboratory shall determine MDLs using the procedures specified in 40 CFR 136 Appendix B, unless the approved test method specifies the procedure for MDL determination or the determination of an MDL is not applicable to the approved test method, such as, total suspended solids, total dissolved solids, total volatile solids, total solids, pH, color, odor, temperature, dissolved oxygen or turbidity.	35 IAC 186.160(a)(11) (lab accreditation)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	The calculation of MDLs pursuant to 40 CFR 136 Appendix B procedures may not be appropriate for multi-component analyses such as aroclors, toxaphene, and technical chlordane because they require a pattern of peak profile recognition for identification. The laboratory shall define the MDL for multi-component analyses as the lowest concentration for which pattern recognition is possible.	35 IAC 186.160(a)(11)(B) (lab accreditation)	X				
	Method detection limit	Achieve the method detection limits (MDLs) defined in Section 611.350(a) according to the procedures in 35 Ill. Adm. Code 183 and 40 CFR 136, Appendix B: "Definition and Procedure for the Determination of the Method Detection Limit—Revision 1.11"…	35 IAC 611.359(a)(2)(C) (drinking water)			X		
	Method detection limit	All lead and copper levels measured less than the PQL and greater than the MDL...must be either reported as measured or as one-half the PQL…	35 IAC 611.359(c)(2) (drinking water)			X		
	Method detection limit	All lead and copper levels below the lead and copper MDL...must be reported as zero	35 IAC 611.359(c)(3) (drinking water)			X		
	Method detection limit	Any sample below the method detection limit must be calculated at zero for the purpose of determining the annual average. BOARD NOTE: The "method detection limit" is different from the "detection limit", as set forth in Section 611.600. The "method detection limit" is the level of contaminant that can be determined by a particular method with a 95 percent degree of confidence, as determined by the method outlined in 40 CFR 136, Appendix B, incorporated by reference at Section 611.102.	35 IAC 611.609(a)(3) (drinking water)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	The use of the term "detect" in this section is not intended to include any analytical capability of quantifying lower levels of any contaminant, or the "method detection limit". Note, however that certain language at the end of federal paragraph (f)(20) is capable of meaning that the "method detection limit" is used to derive the "detection limit".	35 IAC 611.646(a) (drinking water)	X				
	Method detection limit	Method detection limit, as used in subsections (q) and (t) below means the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte. BOARD NOTE: Derived from 40 CFR 136, Appendix B (1994). The method detection limit is determined by the procedure set forth in 40 CFR 136, Appendix B.	35 IAC 611.646(a) (drinking water)	X				
	Method detection limit	Achieve a method detection limit...according to the procedures in 40 CFR 136, Appendix B…	35 IAC 611.646(q)(1)(E) 35 IAC 611.646(q)(2)(C) (drinking water)	X				
	Method detection limit	Determine the method detection limit (MDL), as defined in 40 CFR 136, Appendix B…	35 IAC 611.646(t)(1) (drinking water)	X				
	Method detection limit	In addition...each laboratory...shall achieve a method detection limit ...according to the procedures in 40 CFR 136, App. B…	35 IAC 611.657(b) (drinking water)	X				
	Method detection limit	Method Detection Limit" or "MDL", which means the minimum concentration of a substance that can be measured as reported with 99 percent confidence that the true value is greater than zero…	35 IAC 615.102 35 IAC 620.110 (drinking water)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	...filtered water samples, PQL also means the Method Detection Limit or Estimated Detection Limit...	35 IAC 740.120 (hazardous waste) 35 IAC 742.200 (solid waste)	X				
	Method detection limit	The level of detection for each constituent shall be the minimum concentration of that constituent which can be measured and reported with 99 percent confidence that the true value is greater than zero, which is defined as the method detection limit (MDL)....	35 IAC 811.320(e)(3) 35 IAC 817.416(e)(3) (groundwater)	X				
	Method detection limit	Where the percentage of nondetects in the data base used is less than 15 percent, the operator shall replace NDs with the MDL divided by two, then proceed with the use of one or more of the Normal Theory statistical tests listed in subsection (e)(4);	35 IAC 811.320(e)(3)(A) 35 IAC 817.416(e)(3)(A) (groundwater)			X		
	Method quantitation limit	Method Quantitation Limit or MQL, which means the minimum concentration of a substance that can be measured and reported pursuant to "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods"…	8 IAC 257.10 (groundwater) 8 IAC 258.30 (pesticides) 35 IAC 611.102 35 IAC 620.110 (drinking water)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Minimum level	The concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes and processing steps have been followed. The analytical procedure used for determining minimum level must be a procedure published by USEPA or nationally recognized organization, including but not limited to those methods found in 40 CFR 136, 40 CFR 132, or Standard Methods, incorporated by reference in 35 IAC 302.510.	35 IAC 301.312 (water quality)	X				
	Minimum level	Minimum Level or "ML" is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure approved in 40 CFR 136, assuming that all the method-specified sample weights, volumes and processing steps have been followed.	35 IAC 352.104 (NPDES)	X				
	Minimum level	That quantification level shall be the minimum level (ML) specified in or approved under 40 CFR 136 for the selected method for the toxic substance. If no such ML exists, or if the method is not specified or approved under 40 CFR 136, the quantification level shall be the lowest quantifiable level practicable. In determining the practicability of a method, the Agency shall consider achievability of the identified detection level by competent commercial laboratories.	35 IAC 352.700(a) (NPDES)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Quantification level	Quantification Level is a measurement of the concentration of a contaminant obtained by using a specified laboratory procedure and calibrated at a specified concentration above the method detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring of the contaminant. The analytical procedure used for determining quantification level must be a procedure published by USEPA or nationally, recognized organization, including but not limited to those methods found in 40 CFR 136, 40 CFR 132, or Standard Methods, incorporated by reference in 35 Ill. Adm. Code 302.510.	35 IAC 301.371 (water quality)	X				
	Quantification level	The representative background concentration of pollutants to develop TMDLs and WLAs calculated in the absence of a TMDL shall be established as follows: When determining what available data are acceptable for use in calculating background, the Agency shall use its best professional judgment, including consideration of the sampling location and the reliability of the data through comparison, in part, to detection and quantification levels.	35 IAC 309.141(h)(6)(B)(ii) (NPDES)					X
	Quantification level	Quantification Level is a measurement of the concentration of a contaminant obtained by using a specified laboratory procedure approved in 40 CFR 136 and calibrated at a specified concentration above the method detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring of the contaminant.	35 IAC 352.104 (NPDES)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Quantification level	When a WQBEL...is calculated to be less than the QL, the permit shall include a discharge limit, method and QL consistent with the following: the permit shall include the WQBEL as calculated...the permit shall specify the most sensitive applicable analytical method...the analytical method... shall be the method used for compliance assessment including enforcement actions...The permit shall also identify the QL that can be achieved...That QL shall be the ML specified in or approved under 40 CFR 136 for the selected method for the toxic substance. If no such ML exists, or if the method is not specified or approved under 40 CFR 136, the QL shall be the lowest quantifiable level practicable. In determining the practicability of a method, the Agency shall consider achievability of the identified detection level by competent commercial laboratories. A higher QL may be established if demonstrated to be appropriate due to effluent-specific matrix interference. The Agency may consider alternative methods adopted by the Board for deriving QLs if those methods are...scientifically	35 IAC 352.700(a) (NPDES)	X	X		X	
	Quantification level	The permit shall include a condition requiring the permittee to develop and conduct a pollutant minimization program (PMP) for each pollutant with a WQBEL below the quantification level, unless the permittee can demonstrate that an alternative technique is adequate to assess compliance with the WQBEL.	35 IAC 352.700(b) (NPDES)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Quantification level	The permit shall contain a reopener clause providing for subsequent modification or revocation and reissuance of the permit as warranted by the results of the PMP pursuant to subsection (b), or the availability of new or alternative analytical methods. Such modification or reissuance may accommodate more or less frequent monitoring, a new alternative analytical method or quantification level, or both if appropriate and consistent with subsection (a)(3), or modification or removal of the PMP	35 IAC 352.700(d) (NPDES)		X		X	
	Practical quantification limit	Where practical quantification limits (pql's) are used in any of the following statistical procedures to comply with subsection (i)(5), the pql must be proposed by the owner or operator and approved by the Agency.	36 IAC 724.197(h) (groundwater)			X		
	Practical quantification limit	Any practical quantification limit (pql) approved by the Agency under subsection (h) which is used in the statistical method must be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.	35 IAC 724.197(h)(5)(i)(1) (groundwater)	X				
	Practical quanitification level	Any supplier is deemed to have optimized corrosion control if it submits results of tap monitoring...and source water monitoring...that demonstrate that for two consecutive six-month monitoring periods the difference between the 90th percentile tap water lead level...and the highest source water lead concentration is less than the practical quantitation level for lead...	35 IAC 611.351(b)(3) (drinking water)			X		
	Practical quantitation limit	Practical quantitation limit" or "PQL" means the lowest concentration of a contaminant that a well-operated laboratory can reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.	35 IAC 611.350(b) (drinking water)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	All lead and copper levels measured less than the PQL and greater than the MDL...must be either reported as measured or as one-half the PQL…	35 IAC 611.359(c)(2) (drinking water)			X		
	Practical quantitation limit	Practical Quantitation Limit" or "PQL" means the lowest concentration or level that can be reliably measured within specified limits of precision and accuracy during routine laboratory operating conditions in accordance with "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846...	35 IAC 615.102 35 IAC 620.110 (drinking water)	X				
	Practical quantitation limit	If any measured value is equal to or greater than its PQL, or if any measured value is greater than its corresponding groundwater standard, the actual measured value must be used calculating the mean and standard deviation. If any measured value is less than its PQL and less than its corresponding groundwater standard, the PQL rather than the measured value is to be used in calculating the mean and standard deviation.	35 IAC 616.207(b)(3)-(4) (groundwater)			X		
	Practical quantitation limit	(BOARD NOTE: Constituents that are carcinogens have not been listed in subsection (a)(3)(A) because the standard is set at the PQL and any exceedance thereof is a violation subject to corrective action.)	35 IAC 620.310(a)(3)(A) (groundwater)			X		
	Practical quantitation limit	The analytical methodology...must have a PQL at or below the preventive response levels of Subpart C or groundwater standard set forth in Subpart D…	35 IAC 620.510(a)(3)(A) (groundwater)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	If there is no MCLG for the substance, the guidance level is the Human Threshold Toxicant Advisory Concentration for such substance...unless the concentration for such substance is less than the lowest appropriate PQL...If the concentration for such substance is less than the lowest appropriate PQL for the substance..., the guidance level is the lowest appropriate PQL. If the chemical substance is a carcinogen, the guidance level for any such chemical substance is the lowest appropriate PQL...	35 IAC 620.605(b) (drinking water)			X		
	Practical quantitation limit	For substances which are carcinogens, the acceptable level is...for those substances for which standards have not been established under Section 620.410, the lowest appropriate PQL of USEPA-approved analytical methods specified in SW-846, incorporated by reference at Section 620.125, for each substance.	35 IAC 620, Appendix B(f)(2) (drinking water)			X		
	Practical quantitation limit	If the complex mixture is a carcinogen, the Health Advisory Concentration is the lowest appropriate PQL of USEPA-approved analytical methods specified in SW-846, incorporated by reference at Section 620.125.	35 IAC 620, Appendix C(c) (drinking water)			X		
	Practical quantitation limit	Practical Quantitation Limits ("PQLs") are the lowest concentrations of analytes in groundwater that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The POLs listed are generally stated to one significant figure. Caution: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not part of the regulation.	35 IAC 724, Appendix I(f) (groundwater)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	The methodology shall have a practical quantitation limit (PQL) at or below the objectives or detection levels set forth in 35 Ill. Adm. Code 742 or as set for mixtures or degradation products as provided in Section 732.310 of this Part…	35 IAC 732.307(j)(5)(C)(i) (groundwater)			X		
	Practical quantitation limit	In addition to analytical results, sampling and analytical reports shall contain the following information…analytical procedures including but not limited to the method detection limits and the practical quantitation limits (PQL).	35 IAC 732.307(j)(5)(D)(iii) (groundwater)					X
	Practical quantitation limit	Practical quantitation limit or "PQL" or "Estimated quantitation limit" means the lowest concentration that can be reliably measured within specified limits of precision and accuracy for a specific laboratory analytical method during routine laboratory operating conditions in accordance with...SW-846...filtered water samples, PQL also means the Method Detection Limit or Estimated Detection Limit in accordance with the applicable method revision in: "Methods for the Determination of Metals in Environmental Samples," EPA Publication No. EPA/600/4-91/010; "Methods for the Determination of Organic Compounds in Drinking Water," EPA Publication No. EPA/600/4-88/039; "Methods for the Determination of Organic Compounds in Drinking Water, Supplement II," EPA Publication No. EPA/600/R-92/129; or "Methods for the Determination of Organic Compounds in Drinking Water, Supplement III," EPA Publication No. EPA/600/R-95/131, ...	35 IAC 740.120 (hazardous waste) 35 IAC 742.200 (solid waste)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	The practical quantitation limit (PQL) of the test methods selected must be less than or equal to the PQL for the Target Compound List at Appendix A of this Part, or, if the site remediation objective concentrations have been determined, the PQL must be less than or equal to the remediation objective concentrations for the site.	35 IAC 740.415(d)(3) (hazardous waste)			X		
	Practical quantitation limit	ADL" means Acceptable Detection Limit, which is the detectable concentration of a substance which is equal to the lowest appropriate Practical Quantitation Limit (PQL)…	35 IAC 742.200 (solid waste)	X				
	Practical quantitation limit	However, additional measurements and procedures shall be carried out to establish background concentrations...for any other constituent for which there is no Board-established standard, but which is expected to appear in the leachate at concentration above PQL...	35 IAC 811.315(e)(1)(G)(ii) (groundwater)			X		
	Practical quantitation limit	The confirmation procedures of this subsection shall be used only if the concentrations of the constituents monitored can be measured at or above the practical quantitation limit (PQL). The PQL is defined as the lowest concentration that can be reliably measured within specified limits of precision and accuracy, under routine laboratory operating conditions.	35 IAC 811.319(a)(4)(A) 35 IAC 817.415(a)(4)(A) (groundwater)	X		X		
Louisiana								
	—	Prohibited—the constituent shall be absent in any discharge subject to these standards, as determined by any analytical method.	33 LAC 2603 (NPDES)		X			

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection limit	For determination of biotreatment unit efficiency - Methods found in 40 CFR 63 Appendix C or 40 CFR 63.145. A stream-specific list of VOCs shall be used and is determined as follows: compounds with concentration below one ppm or below the lower detection limit may be excluded...	33 LAC 2153(E)(9)(a) (air)			X		
	Detection limit	For wastes with organic constituents having treatment standards expressed as concentration levels, if compliance with the treatment standards is based in whole or in part on the analytical detection limit alternative specified in LAC 33:V.2223, the certification, signed by an authorized representative, must state the following	33 LAC 2247(C)(3) (hazardous waste)			X		
	Detection limit	Until new guidance or standards are developed, the owner or operator may demonstrate such good-faith efforts by achieving a detection limit for the constituent that does not exceed an order of magnitude above the level provided by LAC 33:V.Chapter 22. Table 2 for F039 nonwastewaters.	33 LAC 3025(B)(2)(a) (hazardous waste)			X		
	Detection limit	For determination of criteria attainment in ambient water where the criteria are below the detection limit, then no detectable concentrations will be allowed. However, for dilution calculations or water quality modeling used to develop total maximum daily load and wasteload allocations, the assigned criteria, even if below the detection limit, will be used.	33 LAC 1113(C)(6)(e) (water quality)			X		
	Detection limit	The treatment or disposal facility may demonstrate compliance with organic constituents if good-faith analytical efforts achieve detection limits for the regulated organic constituents that do not exceed the treatment standards specified in this Section by an order of magnitude.	33 LAC 2223(D)(3) (hazardous waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection limit	An alternative pretreatment limit may not be used if the alternative limit is below the analytical detection limit for any of the regulated pollutants.	33 LAC 2711(E)(1)(b)(2) (pretreatment)		X			
	Detection limit	Comparable Fuel Specifications. Constituent Specification...For compounds listed in Table 7 of this Section the specification levels and, where nondetect is the specification, minimum required detection limits are listed in Table 7 of this Section.	33 LAC 4909(B)(2) (hazardous waste)			X		
	Detection limit	The generator must maintain records of the following information on-site:...the results of all analyses and all detection limits achieved as required under Subsection D.8 of this Section.	33 LAC 4909(D)(10)(e) (hazardous waste)					X
	Detection limit	A groundwater sampling and analysis plan must be prepared which meets the requirements of Subsection E.2.a. of this Section as well as the requirements of Appendix C, and which includes procedures and techniques for:...quality-assurance/quality-control, including detection limits, precision and accuracy of analyses, field blanks, and laboratory spikes and blanks.	33 LAC 709(E)(2)(b)(iv) (groundwater)					X
	Limit of detection	The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment.	33 LAC 709(E)(2)(e)(iii)(e) 33 LAC 3315(I)(5) (groundwater)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Limit of detection	For the purpose of determining the performance of an organic destruction or removal process in accordance with the conditions in each of Subsection C.2.a-f of this Section, the owner or operator shall account for VO concentrations determined to be below the limit of detection of the analytical method by using the following VO concentration:... if any other analytical method is used, one-half the limit of detection established for each organic constituent in the waste that has a Henry's law constant value at least 0.1 mole-fraction-in-the-gas-phase/mole-fraction-in-the-liquid-phase (0.1 Y/X) [which can also be expressed as 1.8 x 10-6 atmospheres/gram-mole/m3] at 25 E C...	33 LAC 1751(C)(2)(i)(ii) (hazardous waste)			X		
	Limit of detection	For the purpose of determining Ci, for individual waste samples analyzed in accordance with Subsection A.3.c of this Section, the owner or operator shall account for VO concentrations determined to be below the limit of detection of the analytical method by using the following VO concentration:	33 LAC 4727(A)(3)(d)(ii) (hazardous waste)			X		
	Limit of detection	The lower limit of detection of vinyl chloride will vary according to the chromatograph used.	33 LAC 6315(C) (air)					X
	Limit of measurement	If a substance is measurable in the influent but not in the effluent, the effluent level may be assumed to be the limit of measurement, and those data may be used by POTW at its discretion and subject to approval by the approval authority...The term "measurement" refers to the ability of the analytical method or protocol to quantify as well as identify the presence of the substance in question.	33 LAC 2713(B)(1) (pretreatment)	X		X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use: Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Limit of quantitation	The action shall be considered complete when the results of samples...show that the concentration of fibers for each of the five samples is less than or equal to a limit of quantitation…	33 LAC 2717(I)(5) (air)			X		
	Practical quantitation limit	The sampling and analysis plan must also include the:...practical quantitation limit for each parameter or constituent.	33 LAC 709(E)(2)(c)(v) (groundwater)					X
	Practical quantification limit	The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantification limit (PQL)...that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.	33 LAC 709(E)(2)(e)(iii)(e) 33 LAC 3315(I)(5) (groundwater)	X		X		
	Practical quantification limit	Where practical quantification limits (PQLs) are used in any of the following statistical procedures to comply with LAC 33:V.3315.I.5, the PQL must be proposed by the owner or operator and approved by the administrative authority.	33 LAC 3315(H) (groundwater)			X		
	Practical quantitation limit	Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in groundwaters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions.	33 LAC, Appendix C (groundwater)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantitation limit (pql) that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.	33 LAC 709(E)(2)(e)(iii)(e) (groundwater)	X		X		
	Practical quantitation limit	Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in groundwaters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. CAUTION: The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.	33 LAC 3325 (groundwater)	X				
	Quantitation limit	Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.	33 LAC 4903(E)(2),Table 5 (hazardous waste)			X		
New Jersey								
	Contract Required Quantitation Limits	An analyte that is a common laboratory contaminant (e.g., acetone, methylene chloride, 2-butanone, phthalates) is negated if: the concentration of the laboratory contaminant in the blank sample exceeds 3 times the Contract Required Quantitation Limits (CRQL) as determined by the U.S.EPA-CLP program or the Method Detection Limit (MDL) for an analyte...	7 NJAC 7:26E, Appendix C,(III)(A)(1)(a) (solid waste)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection level	All values of non-detectable (ND) or values detected below the limits of quantitation are to be ranked as "zero." It is required that appropriate detection levels/quantitation limits be achieved.	7 NJAC 7:26E, Appendix C(6) (solid waste)			X		
	Detection level	Records of operations' monitoring and waste analyses required by (q) above shall include:…the sampling and analytical methods including the minimum detection levels for the analytical procedure utilized...	7 NJAC 7:26-2B.8(r)(4) (solid waste)					X
	Detection limit	Volatile organic compounds, acid extractable compounds, base-neutral organic compounds, pesticides and PCB's will be deleted from the Total Pollutant Load, if reported as non-detectable in all samples for the monitoring period. For all other pollutants, and volatile organic compounds, acid extractable compounds, base-neutral organic compounds, pesticides, and PCB's detected at least once in the monitoring period, the Department shall calculate the Total Pollutant Load using one-half the reported minimum detection limit for pollutant concentrations.	NJAC 7:14A-3.1(c)(1)(i)(2) NJAC 7:14A-3.1(g)(1)(i)(1) (NPDES)			X		
	Detection limit	An alternative pretreatment limit shall not be used if such alternative limit is below the analytical detection limit for any of the regulated pollutants.	NJAC 7:14A-21.4(c)(2) (pretreatment)		X			
	Detection limit	Detection limit (DL) or "instrument detection limit" (IDL) means the lowest concentration above background noise level that an instrument can detect reliably.	NJAC 7:18-1.7 (laboratories)	X				
	Instrument detection limit	Detection limit (DL) or "instrument detection limit" (IDL) means the lowest concentration above background noise level that an instrument can detect reliably.	NJAC 7:18-1.7 (laboratories)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Instrument detection limit	Calibration Summary: A calibration summary shall be submitted for all initial calibration standards and check standards associated with field samples, blanks and QC samples. Each form shall contain the following information: list of all target analytes, the true concentration for the initial calibration standards, the reported (or found) concentrations for the initial calibration standards and check standards, the percent recovery for each initial calibration standard and check standard and the percent recovery QC limits for each target analyte. In addition, this form shall also list the method detection limit and instrument detection limit for each target analyte.	7 NJAC 7:26E, Appendix A (solid waste)					X
	Limit of quantitation	All values of non-detectable (ND) or values detected below the limits of quantitation are to be ranked as "zero." It is required that appropriate detection levels/quantitation limits be achieved.	7 NJAC 7:26E, Appendix C(6) (solid waste)			X		
	Level of detectability	Where the effluent limitations developed pursuant to N.J.A.C. 7:14A-13.6 are below the level of detectability of the procedures in N.J.A.C. 7:18 the Department will use an effluent limitation of nondetectable in any NJPDES permit.	NJAC 7:9B-1.5(e)(5) (water quality)		X			
	Method detection level	MDL means method detection level.	7 NJAC 7:14A-1.1 (NPDES)	X				
	Method detection level	If the owner and/or operator demonstrates through testing that the concentration of any given parameter is consistently below method detection levels as determined using the Toxicity Characteristic Leaching Procedure (TCLP)...or the concentration of any given parameter as determined using a total metals analysis...is consistently below 20 times the regulatory threshold levels of the TCLP, the permittee may request the Department to eliminate those parameters from subsequent analysis.	7 NJAC 7:26-2B.8(n) (solid waste)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	Selection and derivation of PQLs shall be as follows:...PQLs derived by multiplying times a factor of five, a median, Interlaboratory Method Detection Limit (MDL). The Interlaboratory MDL is derived from verified MDL data from Department-certified laboratories for the USEPA 500 series or 600 series methods (in order of preference). PQLs derived by multiplying times a factor of 10, the MDL published by EPA for a specific constituent and analytical method for the USEPA 500 series or 600 series methods (in order of preference).	NJAC 7:9-6.9(c)(3)(ii)(3)-(4) (groundwater)	X				
	Method detection limit	An alternative PQL shall be approved when the evidence (in the context of an applicable regulatory program) establishes that:...The alternative PQL has been determined through rigorous laboratory analysis using methods appropriate to the site-specific groundwater matrix and constituent(s), including, without limitation, the derivation of an MDL using the methodology specified by Appendix B of 40 CFR Part 136;...	7 NJAC 7:9-6.4(c)(3)(iii)(3) (groundwater)	X			X	
	Method detection limit	Method detection limit or "MDL" means the minimum concentration of a contaminant, determined pursuant to 40 CFR 136 (Appendix B) or N.J.A.C. 7:18, that can be measured and reported with 99 percent confidence as an analytical result greater than zero.	NJAC 7:10-1.3 (drinking water)	X				
	Method detection limit	Each analysis shall be conducted using a method capable of achieving an MDL below the MCL for the contaminant being analyzed.	NJAC 7:10-5.3(c) (drinking water)					X
	Method detection limit	A supplier of water from a public community water system, when submitting any sample analysis to the Department, shall provide the following: any test result that exceeds a specified MDL...	NJAC 7:10-5.3(d)(2) (drinking water)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	All domestic and industrial treatment works shall maintain records of the following:…the following quality control and quality assurance information:...method detection limits (aqueous matrix and calculated for the sample based on dry weight).	7 NJAC 7:14C-1.4(f)(8)(v) (NPDES)					X
	Method detection limit	If the laboratory is applying for certification in any of the categories listed in N.J.A.C. 7:18-5.1(a) for which published MDLs are available, MDL data for such methods…	7 NJAC 7:18-2.5(b)(10) (laboratories)					X
	Method detection limit	Method detection limit (MDL) means the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte according to the Guidelines Establishing Test Procedures for the Analysis of Pollutants, 40 CFR 136, Appendix B.	NJAC 7:18:1-7 (laboratories)	X				
	Method detection limit	An ATP proposed as a modification to a DSAM must achieve equal or improved precision, accuracy, and method detection limits when compared to the approved method for the specified parameters; and if the ATP is proposed as a new method rather than as a modification to a DSAM, the laboratory must demonstrate that the proposed ATP will achieve precision, accuracy and method detection limits that are sufficient to meet the data quality requirements of the regulatory program for which the ATP is to be used.	7 NJAC 7:18-2.20(a) (laboratories)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	To apply for an ATP, the certified environmental laboratory shall submit a letter of request to the Department, including:...precision, accuracy, and method detection limits (MDLs) data in reference matrix for the proposed ATP, MDLs shall be determined as outlined in Appendix B of Section 136 of 40 CFR; precision, accuracy, and MDL data for the parameter(s) of interest spiked into the actual matrices covered by the method...	7 NJAC 7:18-2.20(c)(7)-(8) (laboratories)					X
	Method detection limit	A certified environmental laboratory or a laboratory that is applying for certification shall determine its own MDLs in reagent water. MDL data are required for all DSAMs containing reference MDL data for which the laboratory possesses or is applying for certification. The laboratory shall make the MDL determinations in accordance with 40 CFR 136 Appendix B. The Office of Quality Assurance may require the laboratory to determine MDLs for any DSAMs for which it possesses certification...A certified environmental laboratory shall determine its MDL data (as stated in (c)10 above) annually. All regulatory sample data except CERCLA CLP shall include the most recent MDL values determined by the laboratory.	7 NJAC 7:18-5.5(c)(10)-(11) (laboratories)					X
	Method detection limit	If the sample was diluted, the laboratory shall adjust the MDL to reflect the dilution. To calculate the adjusted MDL, the laboratory shall multiply the reagent water MDL by the DF.	7 NJAC 7:18-5.6(j)(7) 7 NJAC 7:18-5.6(l)(7) (laboratories)					X
	Method detection limit	Method detection limit or "MDL" means the minimum concentration of a substance that can be measured and reported with a 99 percent confidence that the analyte concentration is greater than zero and is determined from the analysis of a sample in a given matrix containing the analyte.	7 NJAC 7:26E-1.8 (solid waste)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	Sample matrix cleanup methods shall be performed if: petroleum contaminated soils, sediments, or other solids are analyzed for semivolatile organics, and the method detection limits are elevated above the applicable remediation standard because of matrix interference...	7 NJAC 7:26E-2.1(a)(9)(i) (solid waste)					X
	Method detection limit	Analytical results without all quality control and raw data as required in full and reduced laboratory data deliverables, may be provided for all delineation samples which necessitate additional delineation sampling, and for all long-term groundwater monitoring samples where the site has Department oversight, provided the following information is submitted: The method detection limit and practical quantitation level for each analyte for each sample analysis.	7 NJAC 7:26E-2.1(a)(13)(iii)(4) (groundwater)					X
	Method detection limit	The documentation required for (a)5 above shall include a table comparing the levels of contaminants remaining in the area of concern, the numerical remediation standards which are contained in the approved remedial action workplan and the numerical remediation standards applicable at the time of comparison. The table shall contain all sampling results, including, but not limited to, sample location, sample media, field and laboratory identification numbers, method detection limits as necessary, and analytical results for the area of concern.	7 NJAC 7:26E-3.2(b) (solid waste)			X		
	Method detection limit	Reliability of laboratory analytical data as indicated by compliance with sample holding times, ability to achieve method detection limits and precision and accuracy criteria for the analytical method, and other indicators of data quality.	7 NJAC 7:26E-3.13(b)(3)(i) (solid waste)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	Samples with method detection limits (MDLs) (or practical quantitation levels (PQLs) if available) exceeding the applicable remediation standard shall be identified and an explanation provided in the table key.	7 NJAC 7:26E-3.13(c)(3)(ii) (solid waste)					X
	Method detection limit	Samples with MDLs (or PQLs if available) exceeding the applicable remediation standard shall be identified and an explanation provided in the table key; and	7 NJAC 7:26E-4.8(c)(3)(i)(2) (solid waste)					X
	Method detection limit	If some contaminants are detected and quantified and some contaminants are "estimated" or non-detectable, for purposes of calculating the average, the person submitting the site investigation report shall substitute one half the reported method detection limit for all contaminants reported as non-detectable, and "estimated" values shall be included in the contaminant average "as is."	7 NJAC 7:26E-4.8(c)(3)(i)(3) (solid waste)			X		
	Method detection limit	An analytical results summary form shall be submitted for each sample and for each GC/MS analytical fraction (i.e., volatiles and semi-volatiles). Each form shall contain the following information: date sample received, date sample extracted, date sample analyzed, sample weight/volume, sample moisture content, dilution factor, GC column used, list of analytes, method detection limit, practical quantitation level and detected analyte concentrations.	7 NJAC 7:26E, Appendix A(IV)(2)(A) (solid waste)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	Analytical Results Summary: An analytical results form shall be submitted for each sample. Each form shall contain the following information: sample identification number (laboratory and/or field ID), sample matrix, date sample received, date sample analyzed, sample moisture content, dilution factor (if any), list of target analytes and detected analyte concentrations and method detection limits. Blank Results Summary: A blank results form shall be submitted for all instrument calibration blanks and reagent blanks associated with all field and QC samples. Each form shall contain the following information: list of all target analytes, matrix of the reagent blank, concentration units of the reagent blank, reported concentration of all target analytes found in all calibration and reagent blanks and method detection limits.	7 NJAC 7:26E, Appendix A(IV)(4)(A)(B) (solid waste)					X
	Method detection limit	Calibration Summary: A calibration summary shall be submitted for all initial calibration standards and check standards associated with field samples, blanks and QC samples. Each form shall contain the following information: list of all target analytes, the true concentration for the initial calibration standards, the reported (or found) concentrations for the initial calibration standards and check standards, the percent recovery for each initial calibration standard and check standard and the percent recovery QC limits for each target analyte. In addition, this form shall also list the method detection limit and instrument detection limit for each target analyte.	7 NJAC 7:26E, Appendix A(IV)(4)(C) (solid waste)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	Analytical Results Summary—An analytical results form shall be submitted for each sample. Each form shall contain the following information: sample identification number (laboratory and/or field ID), sample matrix, date sample received, date sample analyzed, sample moisture content, dilution factor (if any), list of target analytes and detected analyte concentrations and method detection limits.	7 NJAC 7:26E, Appendix A(IV)(5) (solid waste)					X
	Method detection limit	An analyte that is a common laboratory contaminant (e.g., acetone, methylene chloride, 2-butanone, phthalates) is negated if: the concentration of the laboratory contaminant in the blank sample exceeds 3 times the Contract Required Quantitation Limits (CRQL) as determined by the U.S.EPA-CLP program or the Method Detection Limit (MDL) for an analyte...	7 NJAC 7:26E, Appendix C,(III)(A)(1)(a) (solid waste)			X		
	Method detection limit	An analyte that is an uncommon laboratory contaminant (i.e., any contaminant not noted in 1 above) is negated if…concentrations of contaminants in the blank sample exceeds the CRQL or MDL...an analyte that is an uncommon laboratory contaminant accepted for scoring purposes if the concentration in the blank sample is less than the CRQL/MDL, AND the concentration in the sample 3 times the blank concentration.	7 NJAC 7:26F, Appendix C(III)(B) (solid waste)			X		
	New Jersey Quantitation Level	"New Jersey Quantitation Level (NJQL)" means the lowest concentration of a particular substance that can be reliably determined, under routine laboratory conditions, within defined limits of precision and accuracy, using Department Sanctioned Analytical Methods (DSAM).	NJAC 7:9B-1.4 (proposed) (water quality)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	New Jersey Quantitation Level	Where regulatory requirements for a pollutant, including NJPDES permit limitations developed to ensure compliance with the surface water quality at NJAC 7:9B-1.14(c) and (d), are established at levels below the promulgated NJQLs (NJAC 7:18-11), the Department shall in accordance with the NJPDES regulations at NJAC 7:14A, consider the discharge to be in compliance as long as the concentration of that pollutant in the regulated medium is less than the applicable NJQL as listed in the Regulations Governing the Certification of Laboratories and Environmental Measurements at NJAC 7:18-11.	NJAC 7:9B-1.5(c)(6) (proposed) (water quality)			X		
	Practical quantification level	PQL means practical quantification level	7 NJAC 7:9-6.4 (groundwater) 7 NJAC 7:14A-1.1 (NPDES)	X				
	Practical quantification limit	Where practical quantification limits (PQLs) are used in any of the following statistical procedures to comply with (i)5 below, the PQL shall be approved by the Department. Use of any of the following statistical methods shall be protective of human health and the environment and shall comply with the performance standards in (i) below.	7 NJAC 7:14A-10.11(h) (groundwater)			X		
	Practical quantification limit	The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantification limit (PQL) approved by the Department under (h) above that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.	NJAC 7:14A-10.11(i)(5) (groundwater)	X		X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation level	Practical quantitation level (PQL) means the lowest concentration of a constituent that can be reliably achieved among laboratories within specified limits of precision and accuracy during routine laboratory operating conditions. "Specified limits of precision and accuracy" are the criteria which have been included in applicable regulations including, but not limited to, those regulations listed at N.J.A.C. 7:9-6.9 or are listed in the calibration specifications or quality control specifications of an analytical method.	7 NJAC 7:9-6.4 (groundwater)	X				
	Practical quantitation level	Where a constituent standard (the criterion as adjusted by the antidegradation policy and applicable criteria exceptions); is of a lower concentration than the relevant PQL (Table 1 in the Appendix), the Department shall not (in the context of an applicable regulatory program) consider the discharge to be causing a contravention of that constituent standard so long as the concentration of the constituent in the affected groundwater is less than the relevant PQL.	7 NJAC 7:9-6.9(c) (groundwater)			X		
	Practical quantitation level	Where interim specific criteria are derived by the Department, interim PQLs shall also be derived for those constituents as appropriate.	7 NJAC 7:9-6.9(c)(1) (groundwater)			X		
	Practical quantitation level	No PQLs other than those listed in Table 1 in the Appendix are applicable to or shall be derived for interim generic criteria.	7 NJAC 7:9-6.9(c)(2) (groundwater)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation level	Selection and derivation of PQLs shall be as follows: PQLs shall be rounded to one significant figure using standard methods. PQLs...shall be, derived or selected for each constituent using the most sensitive analytical method providing positive constituent identification form (c)3ii (1) through (5) below, in that order of preference: PQLs for a specific constituent and analytical method using the USEPA 500 series methods, which PQLs were derived through scientific studies conducted by the Department in support of the Safe Drinking Water Program; PQLs for a specific constituent and analytical method using the USEPA 500 series or 600 series methods (in order of preference, and provided that the method is currently in use by Department-certified laboratories), which PQLs were adopted by the USEPA in support of the Safe Drinking Water Program; PQLs derived by multiplying times a factor of five, a median, Interlaboratory Method Detection Limit (MDL). The Interlaboratory MDL is derived from verified MDL data from Department-certified laboratories for the USEPA 500 series or 600 series methods (in order of	7 NJAC 7:9-6.9(c)(3)(i)-(ii) (groundwater)				X	

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation level	The Department may approve an alternative PQL. An alternative PQL shall be approved when the evidence (in the context of an applicable regulatory program) establishes that: Based upon site-specific, groundwater matrix considerations, a PQL listed in Table 1 for a constituent is not valid; An alternative PQL is more appropriate for that constituent with regard to compliance with this subchapter; The alternative PQL has been determined through rigorous laboratory analysis using methods appropriate to the site-specific groundwater matrix and constituent(s), including, without limitation, the derivation of an MDL using the methodology specified by Appendix B of 40 CFR Part 136; and The alternative PQL does not result in nondetection of any target constituent due to masking effects of other target constituents, non-target constituents, or natural substances.	7 NJAC 7:9-6.9(c)(3)(iii) (groundwater)				X	
	Practical quantitation level	The approval of an alternative PQL shall be applicable to the regulation of groundwater quality affected by the discharge for which it is derived, and its approval and utilization shall be subject to the same procedural requirements as any other aspect of the regulatory decision.	7 NJAC 7:9-6.9(c)(3)(iv) (groundwater)				X	
	Practical quantitation level	The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantitation level (PQL) as defined in N.J.A.C. 7:9-6 that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.	7 NJAC 7:14A-7.7(c) (groundwater)	X		X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantitation limit (PQL) that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.	7 NJAC 7:14A-9.5(h)(5) (groundwater)	X		X		
	Practical quantitation limit	The statistical test shall be conducted separately for each hazardous constituent in each well. Where PQLs are used in any of the following statistical procedures to comply with (i)5 below, the PQL shall be approved by the Department.	NJAC 7:14A-10.11(h) (ground water, hazardous waste)				X	X
	Practical quantitation level	Practical quantitation level or "PQL" means the lowest quantitation level of a given analyte that can be reliably achieved among laboratories within the specified limits of precision and accuracy of a given analytical method during routine laboratory operating conditions.	7 NJAC 7:26E-1.8 (solid waste)	X				
	Practical quantitation level	Analytical results without all quality control and raw data as required in full and reduced laboratory data deliverables, may be provided for all delineation samples which necessitate additional delineation sampling, and for all long-term groundwater monitoring samples where the site has Department oversight, provided the following information is submitted: The method detection limit and practical quantitation level for each analyte for each sample analysis.	7 NJAC 7:26E-2.1(a)(13)(iii)(4) (groundwater)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation level	Samples with method detection limits (MDLs) (or practical quantitation levels (PQLs) if available) exceeding the applicable remediation standard shall be identified and an explanation provided in the table key.	7 NJAC 7:26E-3.13(c)(3)(ii) 7 NJAC 7:26E-4.8(c)(3)(i)(2) (solid waste)			X		
	Practical quantitation level	An analytical results summary form shall be submitted for each sample and for each GC/MS analytical fraction (i.e., volatiles and semi-volatiles). Each form shall contain the following information: date sample received, date sample extracted, date sample analyzed, sample weight/volume, sample moisture content, dilution factor, GC column used, list of analytes, method detection limit, practical quantitation level and detected analyte concentrations.	7 NJAC 7:26E, Appendix A(IV)(2)(A) (solid waste)					X
	Quantitation limits	All values of non-detectable (ND) or values detected below the limits of quantitation are to be ranked as "zero." It is required that appropriate detection levels/quantitation limits be achieved.	7 NJAC 7:26E, Appendix C(6) (solid waste)			X		
Ohio								
	Analytical detection level	If all available effluent data for a pollutant are below the analytical detection levels applied to that data, then a maximum PEQ (projected effluent quality) and an average PEQ cannot be calculated for that pollutant and a determination of WLAs will not be required unless one or more of the conditions in paragraphs (A)(3) to (A)(5) of this rule apply.	OAC 3745-2-04(B)(1) (water quality)		X			

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Analytical detection level	For each pollutant for which discharge-specific effluent data is available and one or more data values equal or exceed the analytical detection levels applied to that data, Ohio EPA shall determine the maximum PEQ and the average PEQ to meet the following requirements, unless otherwise exempt from determination by paragraph (B) of this rule.	OAC 3745-2-04(D) (water quality)		X			
	Analytical detection level	Additionally, if either or both of the total recoverable and dissolved concentrations on which a DMT measurement is based are less than the applicable analytical detection level, the following requirements apply: If the total recoverable concentration, or both the total recoverable and dissolved concentrations, are below the applicable detection level, then the DMT measurement shall not be used in determining the discharge-specific DMT; If only the dissolved concentration is below the applicable detection level, then the DMT measurement may be used in determining the discharge-specific DMT if the dissolved concentration is assumed to equal a concentration no less than the applicable analytical detection level.	OAC 3745-2-04(G)(6) (water quality)		X			
	Analytical detection level	Background water quality...Values reported as less than the reported analytical detection level shall be replaced with one-half of the applied detection level in the calculation of the mean or median. If the analytical detection level for a pollutant is not reported and is not available, the analytical detection level for the most sensitive analytical method currently approved under 40 C.F.R. 136, or other analytical method detection level deemed acceptable by the director, shall be used.	OAC 3745-2-05(A)(3)(a)(iii) (water quality)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Analytical detection level	One-half of the reported analytical detection level for the pollutant or one-half of the lowest water quality criteria, whichever is lower, shall be used as the backgroundwater quality if the pollutant is reasonably suspected of causing or contributing to the impairment or threatening of the designated use in the receiving water.	OAC 3745-2-05(A)(3)(b)(ii) (water quality)			X		
	Analytical detection level	A monitoring requirement shall not be recommended for any group two pollutant. A pollutant shall be assigned to group two if a WLA was not required for one of the following reasons...because all available effluent data for the pollutant are below the analytical detection levels applied to that data...	OAC 3745-2-06(B)(5)(b) (NPDES)		X			
	Analytical detection limit	"Analytical detection limit" means the detection limit applied during the laboratory analyses for a specific measurement or set of measurements.	OAC 3745-2-02(B)(9) (water quality)	X				
	Analytical detection limit	Methods shall be capable of achieving the lowest possible analytical detection limit.	OAC 3745-27-79(D)(2)(d) (solid waste)					X
	Analytical detection limit	For wastes with treatment standards expressed as concentrations in the waste...if compliance with the treatment standards...is based in part or in whole on the analytical detection limit alternative...the certification also shall state the following:	OAC 3745-59-07(B)(5)(c) (hazardous waste)			X		
	Detection limit	The detection limits developed by the analytical laboratory at the time the sample is analyzed shall be used. "Detection limit" is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero.	OAC 3745-27-79(D)(3)(b)(ii) (solid waste)	X				X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection limit	Composite samples from two up to a maximum of five sampling points may be allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL.	OAC 3745-81-24(D)(9) OAC 3745-81-24(E)(7) (drinking water)					X
	Detection limit	For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit. The detection limit shall be that concentration which can be counted with a precision of plus or minus one hundred per cent at the ninety-five per cent confidence level (1.96 sigma where sigma is the standard deviaition of the net counting rate of the sample).	OAC 3745-81-25(C) (drinking water)	X				
	Detection limit	Any sample value below the detection limit shall be considered to be zero. Any lead value above the detection limit but below 0.005 milligram per liter shall either be considered as the measured value or be considered as 0.0025 milligram per liter. Any copper value above the detection limit but below 0.050 milligram per liter shall either be considered as the measured value or be considered as 0.025 milligram per liter.	OAC 3745-81-88(A)(2) (drinking water)			X		
	Limit of detection	The statistical method shall account for data below the limit of detection with one or more statistical procedures that ensure protection of human health and the environment.	OAC 3745-27-10(C)(7)(e) OAC 3745-29-10(C)(7)(e) OAC 3745-30-08(C)(6)(e) OAC 3745-54-97(I)(5) (groundwater)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Limit of quantitation	A minimum of three samples shall be taken and show that the concentration of fibers for each sample is less than or equal to a limit of quantitation for pcm (0.01 fibers per cubic centimeter of air); and	OAC 3701-34-11(A)(2)(a) (air)			X		
	Method detection limit	If the highest concentration of a chemical(s) of concern is determined to be below method detection limits as established by this rule during the preliminary site assessment in accordance with paragraph (H)(2) of this rule, then that chemical(s) of concern may be excluded from future site assessment. If the highest concentration of a chemical(s) of concern are determined to be below method detection limits as established by this rule on subsequent sampling events and it is determined that the results are representative of temporal and spatial conditions, then that chemical(s) of concern may be excluded from future monitoring.	OAC 1301:7-9-13(M)(2) (underground storage tanks)			X		
	Method detection limit	Include in the table the corresponding method detection limit for each analyses that was below detection limits;	OAC 1301:7-9-13(N)(2) (underground storage tanks)					X
	Method detection limit	An additional soil sample shall be taken two feet below the surface at the location of the highest field-screened sample from the treatment zone. If all field-screened readings are below detection limits, the additional soil sample shall be obtained from the center of the treatment zone;	OAC 1301:7-9-16 (underground storage tanks)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	Practical quantification level or "PQL" means a concentration of a pollutant that is five times the method detection limit for the most sensitive available analytical procedure currently approved under 40 C.F.R. 136 for a pollutant, unless the director, by rules adopted in accordance with Chapter 119. of the Revised Code, establishes a different practical quantification level for the pollutant that is consistent with and no more stringent than the appropriate national consensus standard or other generally accepted standard.	OAC 3745-2-02(B)(50) (water quality)	X				
	Method detection limit	Method detection limit or "MDL" means the minimum concentration of a pollutant that can be measured and reported with a ninety-nine per cent confidence that the pollutant concentration is greater than zero as determined by the procedure set forth in appendix B of 40 C.F.R. 136.	OAC 3745-33-01(T) (NPDES)	X				
	Method detection limit	"Practical quantification level" or "PQL" means a concentration of a pollutant that is five times the method detection limit for the most sensitive available analytical procedure currently approved under 40 C.F.R. 136 for a pollutant, unless the director, establishes a PQL for a method using the procedures in rule 3745-33-07(C)(2)(e) of the Administrative Code.	OAC 3745-33-01(CC) (NPDES)	X				
	Method detection limit	Quantification level or "QL" means a measurement of the concentration of a pollutant obtained by using a specified laboratory procedure calibrated at a specified concentration above the method detection limit.	OAC 3745-33-01(GG) (NPDES)	X				
	Method detection limit	...if no such standard exists, the director may establish a PQL in the permit based on MDLs determined using the procedures in 40 C.F.R. 136 appendix B.	OAC 3745-33-07(C)(2)(e) (NPDES)				X	

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	The director may grant a variance to a water quality standard...to any building, structure, facility, or installation from which there is or may be a "discharge of pollutants" (as defined in 40 C.F.R. 122.2), the construction of which commenced after March 23, 1997, unless...WQS and/or method detection limit(s) are issued, modified, and/or adopted after the NPDES permit for the discharge is issued;... To any source for which an NPDES permit was revoked or not renewed and for which a new NPDES permit has been subsequently issued, except that such a source may be eligible to receive a variance if WQS and/or method detection limit(s) are issued, modified, and/or adopted after the source's new NPDES permit is issued;	OAC 3745-33-07(D)(1)(a)(ii),(b) (NPDES)		X			
	Method detection limit	Any sample below the following method detection limit shall be calculated as zero for the purpose of determining the annual average.	OAC 3745-81-23(H)(2) OAC 3745-81-24(B)(9)(a) OAC 3745-81-24(D)(10)(a) (drinking water)			X		
	Method detection limit	Each approved laboratory shall determine the method detection limit (MDL)...at which it is capable of detecting volatile organic chemicals. The acceptable MDL is 0.0005 milligram per liter. This concentration is the detection concentration for purposes of this rule.	OAC 3745-81-24(B)(14) (drinking water)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	In order to be considered for provisional authorization, the laboratory shall submit to the director an application for provisional authorization, on a form provided by the director. The application shall include the following information...documentation that method detection limit (MDL) studies have been completed by the laboratory for each drinking water analysis to be included in the provisional authorization; with the MDL studies indicating that the laboratory is capable of meeting any specified analytical reporting requirements.	OAC 3745-89-10(C)(4) (drinking water)					X
	Method detection limit	The laboratory must also submit…the method detection limit study for the analyte(s) or parameter group(s).	OAC 3745-300-04(O)(1)(a)(i) OAC 3745-300-04(O)(1)(b)(i) (laboratories)					X
	Minimum level	"Minimum level" or "ML" means the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration of a pollutant in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes and processing steps have been followed.	OAC 3745-33-01(U) (NPDES)	X				
	Minimum level	The quantification level is defined as the practical quantification level except, for discharges to the Lake Erie basin, the quantification level shall be the minimum level for analytical procedures that have minimum levels specified in, or approved under, 40 C.F.R. 136.	OAC 3745-33-07(C)(2)(d) (NPDES)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantification level	Practical quantification level or "PQL" means a concentration of a pollutant that is five times the method detection limit for the most sensitive available analytical procedure currently approved under 40 C.F.R. 136 for a pollutant, unless the director, by rules adopted in accordance with Chapter 119. of the Revised Code, establishes a different practical quantification level for the pollutant that is consistent with and no more stringent than the appropriate national consensus standard or other generally accepted standard.	OAC 3745-2-02(50) (water quality)	X			X	
	Practical quantification level	If either or both of the total recoverable and dissolved concentrations on which a DMT measurement is based are less than the applicable practical quantification level (PQL), then the DMT measurement shall not be used in determining the discharge-specific DMT unless the inaccuracies associated with concentrations less than PQL can be demonstrated to be insignificant or are accounted for through application of scientifically defensible conservative measures.	OAC 3745-2-04(G)(6) (water quality)		X			
	Practical quantification level	"Practical quantification level" or "PQL" means a concentration of a pollutant that is five times the method detection limit for the most sensitive available analytical procedure currently approved under 40 C.F.R. 136 for a pollutant, unless the director, establishes a PQL for a method using the procedures in rule 3745-33-07(C)(2)(e) of the Administrative Code.	OAC 3745-33-01(CC) (NPDES)	X			X	
	Practical quantification level	The quantification level is defined as the practical quantification level except, for discharges to the Lake Erie basin, the quantification level shall be the minimum level for analytical procedures that have minimum levels specified in, or approved under, 40 C.F.R. 136.	OAC 3745-33-07(C)(2)(d) (NPDES)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantification level	The director may establish PQLs for a pollutant with a listed method in 40 C.F.R. 136 or, if no analytical method for the pollutant has been promulgated under 40 C.F.R. 136, the director may establish a PQL for the pollutant using an appropriate consensus standard or other generally accepted standard for the analytical method; if no such standard exists, the director may establish a PQL in the permit based on MDLs determined using the procedures in 40 C.F.R. 136 appendix B.	OAC 3745-33-07(C)(2)(e) (NPDES)				X	
	Practical quantification limit	If the permittee chooses to use practical quantification limits (PQL's) in any of the following statistical procedures in order to comply with paragraph (C)(6) of this rule, then the PQL must be proposed by the permittee and approved by the director or his authorized representative before the PQL can be used.	OAC 3745-30-08(C)(5) (groundwater)			X		
	Practical quantification limit	Where practical quantification limits (PQL's) are used in any of the following statistical procedures to comply with paragraph (I)(5) of this rule, the PQL shall be proposed by the owner or operator and approved by the director.	OAC 3745-54-97(H) (groundwater)			X		
	Practical quantification limit	The statistical method shall account for data below the limit of detection with one or more statistical procedures that ensure protection of human health and the environment. Any practical quantification limit (PQL)...used in the statistical method shall be the lowest concentration level that can be reliably achieved within the specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility; and...	OAC 3745-27-10(C)(7)(e) OAC 3745-29-10(C)(7)(e) OAC 3745-30-08(C)(6)(e) OAC 3745-54-97(I)(5) (groundwater)	X		X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	Capable of accounting for data below the limit of detection using the lowest practical quantitation limit (referred to as "PQL") that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the volunteer. The PQL must be below the potable groundwater standard;	OAC 3745-300-07(I)(2)(c)(i) (groundwater)			X		
	Quantification level	Quantification level or "QL" means a measurement of the concentration of a pollutant obtained by using a specified laboratory procedure calibrated at a specified concentration above the method detection limit. The QL is considered the lowest concentration at which a particular pollutant can be measured using a specified laboratory procedure for the monitoring of the pollutant.	OAC 3745-33-01(GG) (NPDES)	X				
	Quantification level	If a PEL for an additive pollutant is less than the quantification level for that pollutant, the director may remove that pollutant from the consideration of additivity.	OAC 3745-33-07(A)(8)(b) (NPDES)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Quantification level	WQBELs below quantification levels. This paragraph shall apply when a water quality based effluent limit for a pollutant is calculated to be less than the quantification level. (1) The director shall designate as the limit in the NPDES permit the WQBEL exactly as calculated; (2) Analytical methods, quantification and compliance levels. (a) The permittee shall use the most sensitive analytical procedure currently approved under 40 C.F.R. 136 for each individual pollutant. (b) If the most sensitive analytical procedure in paragraph (C) (2) (a) of this rule changes, resulting in a more sensitive quantification level, the director may issue a compliance schedule to allow the permittee to implement the new quantification level and demonstrate compliance using the revised quantification level or WQBEL, whichever is higher.	OAC 3745-33-07(C)(1)-(2)(a)-(b) (NPDES)		X	X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Quantification level	WQBELs below quantification levels...(c) For the purpose of assessing compliance with an NPDES permit, any value reported below the quantification level shall be considered in compliance with the effluent limit. For the purpose of calculating compliance with average limitations contained in an NPDES permit, compliance shall be determined by taking the arithmetic mean of reported values for a given reporting period and comparing that mean to the appropriate average permit limitation, using zero for any values detected at concentrations less than the quantification level. Arithmetic mean values that are less than or equal to the permit limitation shall be considered in compliance with the effluent limit. (d) The quantification level is defined as the practical quantification level except, for discharges to the Lake Erie basin, the quantification level shall be the minimum level for analytical procedures that have minimum levels specified in, or approved under, 40 C.F.R. 136.	OAC 3745-33-07(C)(1)-(2)(c) (NPDES)	X		X		
	Quantification level	The quantification level is defined as the practical quantification level except, for discharges to the Lake Erie basin, the quantification level shall be the minimum level for analytical procedures that have minimum levels specified in, or approved under, 40 C.F.R. 136.	OAC 3745-33-07(C)(2)(d) (NPDES)	X				
	Quantification level	Discharge-specific quantification levels. Permittees may apply for discharge-specific quantification levels. Discharge-specific quantification levels shall be calculated using the procedures provided in 40 C.F.R. 136, appendix B.	OAC 3745-33-07(C)(2)(f) (NPDES)				X	

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Quantification level	For discharges to the Lake Erie basin, the director shall include a condition in the permit requiring the permittee to develop and conduct a pollutant minimization program in accordance with rule 3745-33-09 of the Administrative Code for each pollutant with a WQBEL below the quantification level.	OAC 3745-33-07(C)(4) (NPDES)			X		
	Quantification level	A pollutant minimization program shall not be required if the permittee demonstrates that the discharge of a pollutant with a WQBEL below the quantification level (QL) is reasonably expected to be in compliance with the WQBEL at the point of discharge into the receiving water.	OAC 3745-33-09(C) (NPDES)			X		
	Quantitation limit	Laboratory data. Laboratory detection and quantitation limits used.	OAC 1301:7-9-12(L)(2)(e)(vi) (underground storage tanks)					X
Oklahoma								
	Analytical detection limit	In the case of a confirmed human carcinogen, an existing source unable to demonstrate compliance with 252:100-41-36(a) may otherwise obtain authority to operate by installing BACT, or by submitting proof that reasonable control measures are being used; and, a demonstration that maximum ground level concentrations off-site are below analytical detection limits using gas chromatography/mass spectrometer analysis or the equivalent, or...	OAC 252:100-41-38(b)(1)(B)(i) (air)			X		
	Detection limit	Provide a detailed description of all sampling and analysis methods, including:…provide the detection limits for each type of sample and each parameter analyzed.	OAC 252:615-7-2(4)(D)(vi) (groundwater)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection limit	The plan shall include information required in OAC 252:647-3-37, describe all sampling, analysis, and quality assurance/quality control methods to be implemented, and identify proposed…detection limits for each type of sample and parameter.	OAC 252:647-9-91(a)(7) (solid waste)					X
	Detection limit	A ten fiber minimum quantification limit shall be applied when determining the detection limit of a given sample.	OAC 380:50-11-1(6) (air)					X
	Detection limit	Air sampling shall be consistent with Subchapter 11 of this Chapter except worker personal air monitoring may be substituted for inside work area and clearance monitoring provided…all personal monitors have a detection limit below passive background or below 0.01 fibers/cc, whichever is greater.	OAC 380:50-13-1(a)(1)(B) (air)					X
	Limit of detection	The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment.	OAC 252:510-11-7(j)(5) (groundwater)			X		
	Minimum detection limit	For determining compliance with the lead and copper action levels, levels between the practical quantitation limit (PQL) and minimum detection limit (MDL) may be reported as is or as one-half of the PQL. All levels below the MDL must be reported as zero.	OAC 252:630-1-4(a) (drinking water)			X		
	Minimum level of detectability	No airborne fiber count shall be reported to the Department of Labor or any other entity as a numerical value if the count is less than the minimum level of detectability for the method used for analysis. The value shall be reported as less than the detectable limit, with that limit so stated.	OAC 380:50-11-1(5) (air)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Minimum quantification level	MQL means minimum quantification level.	OAC 785:46-15-2 (water quality)	X				
	Minimum quantification level	If sample values are below the MQL for an applicable criterion for a given beneficial use whose criterion is above the MQL, appropriate nonparametric statistical measures shall be used. If sample values are below the MQL for an applicable criterion for a given beneficial use whose criterion is also below the MQL, fifty percent of the criterion may be used.	OAC 785:46-15-3(e) (water quality)			X		
	Minimum quantification limit	A ten fiber minimum quantification limit shall be applied when determining the detection limit of a given sample.	OAC 380:50-11-1(6) (air)					X
	Practical quantitation limit	For determining compliance with the lead and copper action levels, levels between the practical quantitation limit (PQL) and minimum detection limit (MDL) may be reported as is or as one-half of the PQL. All levels below the MDL must be reported as zero.	OAC 252:630-1-4(a) (drinking water)			X		
	Practical quantitation limit	Any practical quantitation limit (pql) that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.	OAC 252:510-11-7(j)(5) (groundwater)	X				
Pennsylvania								

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection level	For not-detectable effluent limits, the most sensitive approved analytical method in Appendix A, Table 2 will be specified in the permit. If there is no approved method, the permittee will be required to identify an analytical method and report it to the Department for approval. Detection levels achieved and all analyses will also be reported to the Department.	25 PA 16.33(n) 25 PA 16.42 (NPDES)					X
	Detection limit	This information provides the expected levels of analytical detectability for toxic priority pollutants. It is intended as a basis for review of NPDES application forms, and for establishing appropriate detection limits and methods of analysis to accompany final effluent limitations in permits.	25 PA 16.101(b) (NPDES)		X			
	Detection limit	Clean techniques refer to methods that reduce contamination and enable the accurate and precise measurement of substances, and to related issues concerning detection limits, quality control, and quality assurance.	25 PA 16.101(c) (NPDES)					X
	Detection limit	When MDLs are not available, detection limits based on other criteria, such as instrument signal to noise ratios, are included in Appendix A, Table 2. Detection limits for metals are generally instrument detection limits.	25 PA 16.102(a)(3)(i) (water quality)				X	
	Detection limit	The permittee is expected generally to achieve the detection limit of the most sensitive method for any pollutant with an effluent limitation of Not Detectable in the permit.	25 PA 16.102(a)(3)(ii) (water quality)		X	X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection limit	The primary source for detection limits in Appendix A, Table 2 is EPA MDL studies. However, when the EPA has not performed an MDL study or reported the detection limit, other sources—particularly, Standard Methods—are consulted. When there is no literature on detection limit, the Department's Bureau of Laboratories may be asked to determine the detection limit based on an MDL study.	25 PA 16.102(a)(3)(iv) (water quality)				X	
	Detection limit	An alternative pretreatment limit may not be used if the alternative limit calculated by either subsection (c)(5)(i) or (ii) is below the analytical detection limit for any of the regulated pollutants.	25 PA 97.91(d)(5)(iii) (pretreatment)		X			
	Estimated quantitation limit	EQL—Estimated quantitation limit.	25 PA 250.1 (solid waste)	X				
	Estimated quantitation limit	For organic compounds, the PQLs shall be the EQLs listed for the GC/Mass spec methods—for example, Method 8240 for volatile organic compounds.	25 PA 250.4(a)(2) (solid waste)					X
	Estimated quantitation limit	For regulated substances when EQLs set by the EPA have a health risk that is greater (less protective) than the risk levels...or for substances when no EQL has been established by the EPA, the limits related to the PQL shall be the quantitation limits established by the methodologies...A level set by multiplying 3.18 by the published method detection limit (MDL) of the most recently approved EPA methodology.	25 PA 250.4(c)(1) (solid waste)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Level of detection	If two approved analytical methods for the same parameter have detection limits that differ by less than 1 ug/l or a factor of 2 (whichever is greater), the permit may be written designating either method as acceptable. The permittee also has the option of using an alternate method approved by the Department and the EPA that the permittee selects as long as he achieves the level of detection of the cited method or the numerical water quality-based limit.	25 PA 16.102(a)(3)(iii) (NPDES)		X		X	
	Method detection limit	Permittees will be required to meet the detection limits listed in Appendix A, Table 2. If the detection limit is not listed, a permittee shall develop a detection limit using an MDL study. In the case where permittees cannot meet a listed detection limit, they may be granted case-specific MDLs if they submit complete documentation demonstrating a matrix effect in their particular effluent. The permittees' shall follow the procedure for determining MDLs published as Appendix B of 40 CFR Part 136 (relating to guidelines establishing test procedures).	25 PA 16.102(a)(4)-(5) (NPDES)		X		X	
	Method detection limit	MDL is the method detection limit for each chemical for each method. The MDL is defined as the minimum concentration that can be measured and reported with 99% confidence that the value is above zero—that is, something is really there. The MDL concentrations listed were obtained using reagent water. Similar results were achieved using representative wastewaters. The MDL achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.	25 PA 16.102(a)(3) (water quality)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use: Definition	Use: NPDES Permit Limits	Use: Compliance	Use: Alternative Limits	Use: Other
	Method detection limit	When MDLs are not available, detection limits based on other criteria, such as instrument signal to noise ratios, are included in Appendix A, Table 2. Detection limits for metals are generally instrument detection limits.	25 PA 16.102(a)(3)(i) (water quality)	X				
	Method detection limit	The primary source for detection limits in Appendix A, Table 2 is EPA MDL studies. However, when the EPA has not performed an MDL study or reported the detection limit, other sources—particularly, Standard Methods—are consulted. When there is no literature on detection limit, the Department's Bureau of Laboratories may be asked to determine the detection limit based on an MDL study.	25 PA 16.102(a)(3)(iv) (water quality)				X	
	Method detection limit	Permittees will be required to meet the detection limits listed in Appendix A, Table 2. If the detection limit is not listed, a permittee shall develop a detection limit using an MDL study. In the case where permittees cannot meet a listed detection limit, they may be granted case-specific MDLs if they submit complete documentation demonstrating a matrix effect in their particular effluent. The permittees' shall follow the procedure for determining MDLs published as Appendix B of 40 CFR Part 136 (relating to guidelines establishing test procedures).	25 PA 16.102(a)(4)-(5) (NPDES)				X	
	Method detection limit	Method detection limit—The amount of a substance which the EPA has determined to be the minimum concentration which can be measured and be reported with 99% confidence that the true value is greater than zero.	25 PA 109.1 (drinking water)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	No contaminants detected. If the results of the special monitoring conducted under §109.302(f) demonstrate that no contaminants are present in concentrations equal to or greater than the method detection limit, the notice required under subsection (a) shall also state that no contaminants were detected.	25 PA 109.406(b) (drinking water)			X		
	Method detection limit	For regulated substances when EQLs set by the EPA have a health risk that is greater (less protective) than the risk levels...or for substances when no EQL has been established by the EPA, the limits related to the PQL shall be the quantitation limits established by the methodologies...A level set by multiplying 3.18 by the published method detection limit (MDL) of the most recently approved EPA methodology.	25 PA 250.4(c)(1) (solid waste)	X		X		
	Practical quantification level	PCB—Total PCB shall not exceed 1 nanogram per liter; however,when the level in water is less than the practical laboratory quanitation level, a fish flesh body burden level in excess of 2 ppm shall be cause for concern and further investigation.	25 PA 93.9w (water quality)			X		
	Practical quantitation level	A large water system is deemed to have optimized corrosion control if the system demonstrates to the Department that for two consecutive 6-month monitoring periods...that the system does not exceed a lead or copper action level and the difference between the 90th percentile tap water lead level and the highest source water lead concentration is less than 0.005 mg/l, which is the Practical Quantitation Level for lead.	25 PA 109.1102(b)(1)(ii) (drinking water)			X		
	Practical quantitation limit	PQL—Practical quantitation limit.	25 PA 250.1 (solid waste)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	The PQLs shall be selected from the PQLs specified by the EPA as EQLs in the most current version of the EPA RCRA Manual SW-846 (U.S. EPA, 1990. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Third Edition. Office of Solid Waste and Emergency Response) for soil listed as "low level soil" and for groundwater listed as "groundwater" in accordance with the following: For inorganic compounds, the PQLs under this chapter shall be the values listed for methods associated with analysis by Inductively Coupled Plasma (ICP) with the following exceptions...	25 PA 250.4(a)(1) (solid waste)	X				
	Practical quantitation limit	For organic compounds, the PQLs shall be the EQLs listed for the GC/Mass spec methods—for example, Method 8240 for volatile organic compounds.	25 PA 250.4(a)(2) (solid waste)	X				
	Practical quantitation limit	If the PQL selected under subsection (a) is higher than the MCL or HAL for an organic regulated substance in groundwater, the PQLs shall be derived from the analytical methodologies published under the drinking water program in the most current version of Methods for the Determination of Organic Compounds in Drinking Water (U. S. EPA, 1988, Environmental Monitoring Systems Laboratory, EPA/600/4-88/039). If a PQL determined under this subsection is not below a HAL, the methodologies in subsection (c)(1) or (2) shall be used unless those quantitation limits are higher than the PQL determined under this subsection.	25 PA 250.4(b) (solid waste)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	For regulated substances when EQLs set by the EPA have a health risk that is greater (less protective) than the risk levels...or for substances when no EQL has been established by the EPA, the limits related to the PQL shall be the quantitation limits established by the methodologies...A level set by multiplying 3.18 by the published method detection limit (MDL) of the most recently approved EPA methodology.	25 PA 250.4(c)(1) (solid waste)	X				
	Practical quantitation limit	For regulated substances which have no limits related to PQLs identified in subsection (c)(1) or (2), a person shall demonstrate attainment under the site-specific standard or the background standard.	25 PA 250.4(d) (solid waste)			X		
	Practical quantitation limit	The concentration of the regulated substance cannot exceed the limit related to the PQL or background throughout the soil buffer.	25 PA 250.308(b)(2) (solid waste)			X		
	Practical quantitation limit	For purposes of determining attainment of one or a combination of remediation standards, the concentration of a regulated substance is not required to be less than the limits relating to the PQLs for a regulated substance in accordance with §250.4 (relating to limits related to PQLs).	25 PA 250.701(c) (solid waste)			X		
	Practical quantitation limit	Concentrations of regulated substances in the plume at the point of compliance monitoring wells along the downgradient property boundary are all less than or equal to the groundwater standard or the limit relating to the PQL, whichever is higher, in all samples collected during the quarters of monitoring.	25 PA 250.704(d)(3) (groundwater)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use: Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	For parametric methods...the censoring level for each nondetect (ND) shall be the assigned value randomly generated that is between zero and the limit related to the PQL.	25 PA 250.707(a)(1)(v) 25 PA 250.707(a)(2)(ix) 25 PA 250.707(a)(3)(ix) 25 PA 250.707(d)(2)(iv) (groundwater)			X		
	Practical quantitation limit	Seventy-five percent of all samples, which shall be randomly collected in a single event from the site, shall be equal to or less than the Statewide health standard or the limit related to PQLs with no individual sample exceeding ten times the Statewide health standard.	25 PA 250.707(b)(1)(i) (solid waste)			X		
	Practical quantitation limit	Seventy-five percent of all samples collected within each monitoring well over time shall be equal to or less than the Statewide health standard or the limit related to PQLs with no individual sample exceeding both of the following:	25 PA 250.707(b)(2)(i) (solid waste)			X		
	Practical quantitation limit	For the limits relating to the PQLs, Statewide health and site-specific standards, the false-positive rate for a statistical test may not be greater than 0.20 for nonresidential and 0.05 for residential.	25 PA 250.707(d)(2)(vii) (solid waste)			X		
	Quantitation limit	When a minimum threshold MSC is used as a Statewide health standard, the minimum threshold MSC is the Statewide health standard regardless of whether it is higher or lower than a quantitation limit established by this section.	25 PA 250.4(e) (solid waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Quantitation limit	If analytical quantitation limits prevent determination of the acceptability of a residual waste under this paragraph, the Department may consider the total analysis of the waste as well as the physical and chemical characteristics of the contaminant in making a determination of acceptability of the waste at the facility.	25 PA 288.523(a)(1) 25 PA 288.623(a)(1)(ii) 25 PA 289.523(a)(1) (solid waste)			X		
Texas								
	Detectable level	Essential insolubility is established:...the extract(s) from the representative sampling of the waste does not exhibit detectable levels of constituents...; and...the waste does not exhibit detectable levels of total petroleum hydrocarbon (TPH)...; and...the waste does not exhibit detectable levels of polychlorinated biphenyls (PCB's).	30 TAC 335.507(4)(A) (solid/hazardous waste)			X		
	Detection level	If the detection level submitted by the generator is challenged by the commission, and for other enforcement purposes, the burden is on the generator to demonstrate that the detection level was reasonable for the material in question and for the technology in use at the time the waste was classified.	30 TAC 335.507(4)(C) (solid waste)				X	
	Detection limit	Determination of biotreatment unit efficiency. Use the methods found in 40 CFR 63 Appendix C or 40 CFR 63.145. A stream-specific list of VOCs shall be used and is determined as follows: compounds with concentrations below one part per million by weight (ppmw) or below the lower detection limit may be excluded;...	30 TAC 115.145(8)(A) (air)			X		
	Detection limit	Detection limits for each analytical method are as listed in 40 CFR 141.23(a)(4)(i).	30 TAC 290.108(1)(E)(i) (drinking water)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection limit	Sample quantitation limit—The method detection limit, as defined in this section, adjusted to reflect sample-specific actions, such as dilution or use of smaller aliquot sizes than prescribed in the analytical method, and takes into account sample characteristics, sample preparation, and analytical adjustments. The term, as used in this rule, is analogous to the sample-specific detection limit.	30 TAC 350.4(a)(78) (solid waste)	X				
	Limit of detection	The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment.	30 TAC 330.233(g)(5) (groundwater)			X		
	Method detection limit	Any sample below the method detection limit shall be calculated at zero for the purpose of determining the annual average.	30 TAC 290.108(9)(A) 30 TAC 290.109(a)(11)(A) (drinking water)			X		
	Method detection limit	The Practical Quantitation Limits (PQL) and the Method Detection Limits (MDL) shall be as stated in 40 Code of Federal Regulations, §141.89...All lead levels measured between the PQL and the MDL must be reported as measured and all lead levels measured below the MDL must be reported as zero.	30 TAC 290.120(j)(2),(4) (drinking water)			X		
	Method detection limit	Method detection limit-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. The method detection limit (MDL) is estimated in accordance with 40 Code of Federal Regulations, 136, Appendix B.	30 TAC 307.3(a)(24) (water quality)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	The minimum analytical level is not the published method detection limit for an EPA-approved analytical method, which is based on laboratory analysis of the substance in reagent (distilled) water. The minimum analytical level is based on analyses of the analyte in the matrix of concern (i.e., waste-water effluents).	30 TAC 307.3(a)(25) (water quality)	X				
	Method detection limit	The specified definition of permit compliance for a specific toxic material will not be lower than established minimum analytical levels, unless that toxic material is of particular concern in the receiving waters, or unless an effluent specific method detection limit has been developed in accordance with 40 CFR Part 136.	30 TAC 307.8(c) (water quality)			X		
	Method detection limit	Method detection limit—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 for each chemical of concern (COC) from the analysis of a sample of a given matrix type containing the COC.	30 TAC 350.4(a)(53) (solid waste)	X				
	Method detection limit	Sample quantitation limit—The method detection limit, as defined in this section, adjusted to reflect sample-specific actions, such as dilution or use of smaller aliquot sizes than prescribed in the analytical method, and takes into account sample characteristics, sample preparation, and analytical adjustments. The term, as used in this rule, is analogous to the sample-specific detection limit.	30 TAC 350.4(a)(78) (solid waste)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	The method detection limit shall be verified after major instrument maintenance, a change in analyst, or major changes in instrumentation or instrument conditions. The person shall ensure that the laboratory has performed and has documented an initial demonstration of proficiency for the analysis of each COC and each method used, and has also demonstrated, in a scientifically valid manner, and has documented the method detection limit the laboratory can achieve. This demonstration and documentation shall be preparatory and method specific and include any cleanup method used. The method detection limit should be routinely checked for reasonableness.	30 TAC 350.54(e)(4) (solid waste)					X
	Method detection limit	The person shall report all results (corrected for sample weight or volume, sample preparations, and/or laboratory adjustments) greater than the method detection limit that meet the qualitative identification criteria recommended in the analytical method used, and shall use a qualifier flag on all those results reported as greater than the method detection limit and less than the method quantitation limit; and...	30 TAC 350.54(h)(1) (solid waste)					X
	Method detection limit	For the purposes of determining whether a COC meets the conditions of paragraphs (1), (2), or (3) of this subsection, a COC should be considered detected in a particular environmental medium if the analytical measurement is greater than the method detection limit and the analytical response meets the qualitative identification criteria recommended in the analytical method.	30 TAC 350.71(k) (solid waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use: Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	There are various terms used to quantify sensitivity of analytical test procedures. In 40 CFR 136 Appendix B, the MDL is defined as 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 the analysis of a sample in a given matrix containing the analyte.	Water Quality Implementation Procedures (Establishing Permit Limits/ Analytical Procedures)	X				
	Method quantitation limit	Method quantitation limit—The lowest non-zero concentration standard in the laboratory's initial calibration curve and is based on the final volume of extract (or sample) used by the laboratory.	30 TAC 350.4(a)(54) (solid waste)	X				
	Method quantitation limit	The person shall report all results (corrected for sample weight or volume, sample preparations, and/or laboratory adjustments) greater than the method detection limit that meet the qualitative identification criteria recommended in the analytical method used, and shall use a qualifier flag on all those results reported as greater than the method detection limit and less than the method quantitation limit; and...	30 TAC 350.54(h)(1) (solid waste)	X				
	Method quantitation limit	Method quantitation limit	30 TAC 350.51(d)(1) (solid waste)	X				
	Method quantitation limit	These data quality objectives should include, but are not limited to:...the levels of required performance (e.g., assessment level, critical PCL, attenuation action level) and the applicable method quantitation limit in accordance with subsection (e)(3) of this section for each COC; and...	30 TAC 350.54(b)(2) (solid waste)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method quantitation limit	In order to address sensitivity requirements, the person shall select a standard available analytical method that provides a method quantitation limit below the necessary level of required performance for purposes of assessment as well as demonstration of conformance with critical PCLs. If it is not possible to achieve a method quantitation limit below the necessary level of required performance, and the COC does not meet the conditions of §350.71(k) of this title (relating to General Requirements), then the person shall select the standard available analytical method that provides the lowest possible method quantitation limit for that COC. The executive director may require that the person demonstrate that a lower method quantitation limit is not achievable or is not practicable, using standard available analytical methods.	30 TAC 350.54(e)(3) (solid waste)			X		
	Method quantitation limit	Application of the method shall include the use of instrument calibration that brackets the value reported or includes a low standard that is below the necessary level of required performance, unless the method quantitation limit has been determined to be the necessary level of required performance in accordance with §350.78(c). The calibration range shall yield results which demonstrate that the sample reporting level has not exceeded the necessary level of required performance after correction for sample weight or volume. Laboratory control samples must be used to demonstrate that the method can produce results for the COCs that meet the bias and precision requirements at or below the necessary level of required performance or at the method quantitation limit in a clean laboratory matrix.	30 TAC 350.54(e)(6) (solid waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method quantitation limit	The COC is not detected in any sample in the environmental medium, or the person is required to comply with the conditions of this paragraph as a part of meeting the requirements of §350.71(k)(2), and the conditions in subparagraph (A) or (B) of this paragraph are met. All sample quantitation limits are less than the residential assessment level for the environmental medium...the sample quantitation limit(s) of the COC in critical samples are less than the method quantitation limit of the analytical method used;...	30 TAC 350.71(k)(3)(B)(iii) (solid waste)			X		
	Method quantitation limit	If the critical protective concentration level (PCL) for a COC established in subsection (a) of this section is less than the method quantitation limit as defined in §350.4 of this title (relating to Definitions and Acronyms) or background concentration for that COC as determined in accordance with §350.51(l) and (m) of this title (relating to Affected Property Assessment), then the greater of the method quantitation limit or background concentration is the critical PCL for that COC.	30 TAC 350.78(c) (solid waste)			X		
	Method quantitation limit	If the person satisfactorily demonstrates that all reasonably available analytical technology...has been used to show that the COC cannot be measured to the method quantitation limit due to sample specific interferences, then the person shall be allowed to determine attainment based on the sample quantitation limit.	30 TAC 350.79 (solid waste)			X		
	Minimum analytical level	Minimum Analytical Level or MAL-The lowest concentration at which a particular substance can be quantitatively measured in the matrix of concern (i.e., wastewater) with a defined precision level, using approved analytical methods.	30 TAC 210.52 (wastewater)	X				

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Minimum analytical level	Minimum analytical level-The lowest concentration at which a particular substance can be quantitatively measured with a defined precision level, using approved analytical methods. The minimum analytical level is not the published method detection limit for an EPA-approved analytical method, which is based on laboratory analysis of the substance in reagent (distilled) water. The minimum analytical level is based on analyses of the analyte in the matrix of concern (i.e., waste-water effluents). The commission will establish general minimum analytical levels that will be applicable when information on matrix-specific minimum analytical levels is unavailable.	30 TAC 307.3(a)(25) (water quality)	X				
	Minimum analytical level	Minimum analytical levels. The specified definition of permit compliance for a specific toxic material will not be lower than established minimum analytical levels, unless that toxic material is of particular concern in the receiving waters, or unless an effluent specific method detection limit has been developed in accordance with 40 CFR Part 136. Minimum analytical levels are listed in the standards implementation procedures.	30 TAC 307.8(c) (water quality)			X		
	Minimum analytical level	The MALs were developed by the the commission to establish a benchmark for analytical procedures for measuring the toxic pollutants regulated by 30 TAC 307.6. One of the goals of establishing the MALs has been to provide consistent analytical data for industrial and municipal permit applicants and compliance monitoring of their discharges. The MALs serve as a measure of the analytical sensitivity of each laboratory procedure performed on standard laboratory equipment by qualified personnel.	Water Quality Implementation Procedures (Establishing Permit Limits/ Analytical Procedures)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Minimum analytical level	In 30 TAC 307, the MAL is defined as the lowest concentration at which a particular substance can be quantitatively measured with a defined accuracy and precision level, using approved analytical methods. The MAL is not the published MDL for an EPA-approved analytical method, which is based on a single laboratory analysis of the substance in reagent (distilled) water. The MAL is based on analyses of the analyte in the matrix of concern (i.e., wastewater effluents). The commission will establish general MALs that will be applicable when information on matrix-specific MALs are unavailable. General MALs are established in this document (see Tables 9 and 10 [*in the Implementation Procedures*]).	Water Quality Implementation Procedures (Establishing Permit Limits/ Analytical Procedures)	X			X	
	Minimum analytical level	If the permittee cannot attain the MAL for a specific pollutant and has exhausted all available techniques to solve interference and matrix problems, they may apply for an alternate MAL through the alternate analytical test method procedure provided that all documentation of attempted solutions to the interference/matrix problems is included with the application. This documentation must include all quality assurance/quality control data.	Implementation Procedures (Establishing Permit Limits/ Alternate Analytical Test Methods)				X	

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use: Definition	Use: NPDES Permit Limits	Use: Compliance	Use: Alternative Limits	Use: Other
	Minimum analytical level	If a toxic pollutant is not detected (using the appropriate analytical methods) in any of the four retests, and the non-detectable level is equal to or less than the MAL, then a value of zero is assumed when calculating the average. If any of the four retests detect the toxic pollutant, then a value of one-half the non-detectable level that the applicant reported or one-half of the commission's MAL, whichever is less, will be used for averaging instead of zero. If a toxic pollutant is quantified below the MAL and equals or exceeds 70% of the calculated daily average permit limit, the applicant may be required to submit historical data or to retest as stated above, and the applicant may also be required to establish a site-specific MAL for the effluent.	Implementation Procedures (Establishing Permit Limits/ Application Screening)		X	X	X	
	Minimum analytical level	If the permit limit is lower than the MAL, then a level of compliance will be established in the permit based upon the MAL except where a substance is of particular concern (e.g., if the toxicant has a high bioconcentration factor). If the commission believes it is necessary to establish a permit level of compliance below the MAL, the permittee will be required to develop an effluent-specific MDL. When necessary, the permit applicant may request an opportunity to demonstrate an alternative site-specific MAL for the effluent to account for interfering factors associated with the wastewater in question.	Implementation Procedures (Establishing Permit Limits/ Defining Permit Limits)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Minimum analytical level	Test methods utitlized to determine compliance with the permit limitations shall be sensitive enough to detect the parameters listed above at the MAL. Permit compliance/noncompliance determinations will be based on the effluent limitations contained in this permit with consideration given to the MAL for toxic organic and toxic inorganic parameters. When an analysis of an effluent sample for these parameters results in a measurement of less than the MAL, the parameter shall be reported as "<(MAL value)" and this shall be interpreted as a value of zero (0) for compliance purposes.	TPDES (permit language)			X		
	Practical quantitation limit	The Practical Quantitation Limits (PQL) and the Method Detection Limits (MDL) shall be as stated in 40 Code of Federal Regulations, §141.89...All lead levels measured between the PQL and the MDL must be reported as measured and all lead levels measured below the MDL must be reported as zero.	30 TAC 290.120(j)(2),(4) (drinking water)			X		
	Practical quantitation limit	The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantitation limit (PQL) that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.	30 TAC 330.233(g)(5) (groundwater)	X		X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantification limit	Where practical quantification limits (POLs) are used in any of the following statistical procedures to comply with paragraph (9)(E) of this section the (POL) must be proposed by the owner or operator and approved by the executive director. Use of any of the following statistical methods must be protective of human health and the environment and must comply with the performance standards outlined in paragraph (9) of this section.	30 TAC 335.163(8) (groundwater)				X	
	Practical quantitation limit	Where matrix interferences of the waste cause the Practical Quantitation Limit (PQL) of the specific analysis to be greater than the Maximum Concentration listed in §335.521(a)(1), then the achievable PQL becomes the Maximum Concentration, provided that the generator maintains documentation which would satisfactorily demonstrate to the executive director that lower levels of quantitation of a sample are not possible.	30 TAC 335.505(1) (solid waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	Practical quantitation limit/PQL-The lowest concentration of an analyte which can be reliably quantified within specified limits of precision and accuracy during routine laboratory operating conditions. The PQL minimizes to the extent possible the effects of instrument and operator variability and the influences of the sample matrix and other contaminants or substances upon the quantitation of the analyte. "Specified limits of precision and accuracy" are the criteria which have been included in applicable regulations or which are listed in the quality control sections of the analytical method. The PQL may be directly obtained or derived from the following sources with preference given to the most recent, scientifically valid method: federal regulations; EPA guidance documents; calculation from interlaboratory studies; and experimentally determined analytical methods not available from other existing sources.	30 TAC 335.552 (solid waste)	X			X	
	Practical quantitation limit	If the Practical Quantitation Limit (PQL) is greater than background, then the PQL rather than background shall be used as the cleanup level provided that the person satisfactory demonstrates to the executive director that lower levels of quantitation of a contaminant are not possible.	30 TAC 335.554(d) (solid waste)			X		
	Practical quantitation limit	If the Practical Quantitation Limit (PQL) and/or the background concentration, determined in a manner consistent with §335.554 of this title (relating to Attainment of Risk Reduction Standard Number 1) for a contaminant is greater than the cleanup level, the greater of the PQL or background shall be used for determining compliance with the requirements of this section.	30 TAC 335.555(d)(1) (solid waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	If the Practical Quantitation Limit (PQL) or the background concentration (represented by results of analyses of samples taken from media that are not affected by waste management or industrial activities) for a contaminant is greater than the cleanup level determined by procedures of this section, then the greater of the PQL or background shall become the cleanup level.	30 TAC 335.563(j)(1) (solid waste)			X		
	Sample quantitation limit	Sample quantitation limit—The method detection limit, as defined in this section, adjusted to reflect sample-specific actions, such as dilution or use of smaller aliquot sizes than prescribed in the analytical method, and takes into account sample characteristics, sample preparation, and analytical adjustments. The term, as used in this rule, is analogous to the sample-specific detection limit.	30 TAC 350.4(a)(78) (solid waste)	X				
	Sample quantitation limit	If the person satisfactorily demonstrates that all reasonably available analytical technology has been used to show that the COC cannot be measured to the method quantitation limit due to sample specific interferences, then the sample quantitation limit may be used in lieu of the method quantitation limit.	30 TAC 350.51(d)(1) (solid waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use: Definition	Use: NPDES Permit Limits	Use: Compliance	Use: Alternative Limits	Use: Other
	Sample quantitation limit	In cases where there is reason to believe, based on available analytical data, that the COC could be present at that sampling location and that the concentration of the COC is suspected to be near but below the sample quantitation limit, the full value of the sample quantitation limit should be used as a proxy for the non-detected result. If there is reason to believe, based on available analytical data, that the COC could be present at that sampling location and that the concentration of the COC is suspected to be below, but not near to, the sample quantitation limit, then 1/2 the sample quantitation limit should be used as a proxy for the non-detected result.	30 TAC 350.51(n) (solid waste)			X		
	Sample quantitation limit	The person shall...report all non-detected results as less than the value of the sample quantitation limit; or…	30 TAC 350.54(h)(2) (solid waste)			X		
	Sample quantitation limit	The COC is detected in at least one sample, but all detected COC concentrations and sample quantitation limits are less than the residential assessment level in the environmental medium being evaluated under this paragraph, as well as in all other environmental media from which samples were collected.	30 TAC 350.71(k)(1) (solid waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Sample quantitation limit	The COC is not detected in any sample in the environmental medium, or the person is required to comply with the conditions of this paragraph as a part of meeting the requirements of §350.71(k)(2), and the conditions in subparagraph (A) or (B) of this paragraph are met. The sample quantitation limits in some samples are greater than the residential assessment level for the environmental medium, but all of the conditions in clauses (i)-(vi) of this subparagraph are met: All sample quantitation limits are less than the residential assessment level for the environmental medium...the sample quantitation limit(s) of the COC in critical samples are less than the method quantitation limit of the analytical method used;...	30 TAC 350.71(k)(3)(A),(B)(iii) (solid waste)			X		
	Sample quantitation limit	If the person satisfactorily demonstrates that all reasonably available analytical technology...has been used to show that the COC cannot be measured to the method quantitation limit due to sample specific interferences, then the person shall be allowed to determine attainment based on the sample quantitation limit.	30 TAC 350.79 (solid waste)			X		
Washington								
	Detectable level	In cases where a cleanup level required by this chapter is less than the practical quantitation limit using an approved analytical procedure, the department may also require one or more of the following: …monitoring to assure that the concentration of a hazardous substance does not exceed detectable levels.	WAC 173-340-707(3)(c) (solid waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection limit	Where a laboratory analysis indicates a chemical is not detected in a sediment sample, the detection limit shall be reported and shall be at or below the Marine Sediment Quality Standards chemical criteria value...	WAC 173-204-320(2)(a) WAC 173-204-420(2)(a) WAC 173-204-520(2)(a) (water quality)			X		
	Detection limit	Where chemical analyses identify an undetected value for every individual compound/isomer, then the single highest detection limit shall represent the sum of the respective compounds/isomers; and where chemical analyses detect one or more individual compounds/isomers, only the detected concentrations will be added to represent the group sum.	WAC 173-204-320(2)(b) WAC 173-204-420(2)(b) WAC 173-204-520(2)(b) (water quality)			X		
	Detection limit	For cleanup levels based on chronic or carcinogenic threats, the mean concentration shall be used to evaluate compliance with groundwater cleanup levels unless there are large variations in concentrations relative to the mean concentration or a large percentage of concentrations below the detection limit.	WAC 173-340-720(8)(c)(v)(B) (groundwater)			X		
	Detection limit	For cleanup levels based on chronic or carcinogenic threats, the mean soil concentration shall be used to evaluate compliance with cleanup levels unless there are large variations in concentrations relative to the mean hazardous substance concentration or a large percentage of concentrations are below the detection limit.	WAC 173-340-740(7)(c)(iv)(B) (solid waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Detection limit	When an unregulated chemical is verified at a concentration above the detection limit, the purveyor shall submit the sample analysis results to the department within seven days receipt from the laboratory, and sample the source a minimum of once every three months for one year and then annually thereafter during the three-month period when the highest previous measurement occurred.	WAC 245-290-320(8)(b) (drinking water)			X		
	Limit of detection	The statistical method must account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment	WAC 173-303-645(8)(i)(v) (groundwater)			X		
	Limit of detection	The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment.	WAC 173-351-420(3)(e) (groundwater)			X		
	Limits of quantitation	Laboratories shall achieve the lowest practical quantitation limits consistent with the selected method and WAC 173-340-707.	WAC 173-340-830(2)(f) (solid waste)					X
	Method detection limit	The minimum concentration of a compound that can be measured and reported with 99% confidence that the value is greater than zero.	WAC 173-340-200 (solid waste)	X				
	Method detection limit	If those situations arise and the practical quantitation limit is higher than the cleanup level for that substance, the cleanup level shall be considered to have been attained, subject to subsection (4) of this section, only when the more stringent of the following conditions are met: the practical quantitation limit is no greater than ten times the method detection limit; or...	WAC 173-340-707(2)(a) (solid waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	In cases where a cleanup level required by this chapter is less than the practical quantitation limit using an approved analytical procedure, the department may also require one or more of the following: …use or development of specialized sample collection or analysis techniques to improve the method detection limit or practical quantitation limit for the hazardous substances at the site; or ...	WAC 173-340-707(3)(b) (solid waste)			X	X	
	Method detection limit	For purposes of estimating background concentrations, values below the method detection limit shall be assigned a value equal to one-half the method detection limit. Measurements above the method detection limit, but below the practical quantitation limit shall be assigned a value equal to the method detection limit. The department may approve the use of alternate statistical procedures for handling data below the method detection limit or practical quantitation limit.	WAC 173-340-708(11)(e) (solid waste)			X		
	Method detection limit	For purposes of demonstrating compliance with groundwater cleanup levels, measurements below the method detection limit shall be assigned a value equal to one-half the method detection limit. Measurements above the method detection limit, but below the practical quantitation limit shall be assigned a value equal to the method detection limit.	WAC 173-340-720(8)(g) (groundwater)			X		
	Method detection limit	For purposes of demonstrating compliance, measurements below the method detection limit shall be assigned a value equal to one-half the method detection limit. Measurements above the method detection limit, but below the practical quantitation limit shall generally be assigned a value equal to the method detection limit.	WAC 173-340-730(7)(g) (water quality)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Method detection limit	The methods used for sample collection, sample preservation, transportation, allowable time before analysis, sample preparation, analysis, method detection limits, practical quantitation limits, quality control, quality assurance, and other technical requirements and specifications shall comply with the following requirements, as applicable.	WAC 173-340-830(4)(a) (solid waste)					X
	Practical quantification level	The lowest concentration of a substance that can be reliably achieved within specific limits of precision, accuracy, representativeness, completeness, and comparability during routine laboratory operating conditions.	WAC 173-200-020(23) (groundwater)	X				
	Practical quantification level	When a criterion is less than the practical quantification level, the enforcement limit shall be established in an alternate location to provide a realistic estimate that the criterion shall not be exceeded in the groundwater. Evaluation for such enforcement limits shall be performed in accordance with WAC 173-200-080(5).	WAC 173-200-050(3)(b)(iii) (groundwater)			X		
	Practical quantification level	Where a criterion is not established for a contaminant, the enforcement limit in groundwater shall not exceed the practical quantification level except…if clear and convincing evidence can be provided to the department that an alternative concentration will provide protection to human health and the environment, the department may establish an enforcement limit higher than the practical quantification level.	WAC 173-200-050(4)(b) (groundwater)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantification limit	When it is impractical to evaluate the impact of an activity at the designated point of compliance, for example, when a criterion is less than the practical quantification limit, evaluation shall be designed and performed at an alternate location to provide a realistic estimate of conditions in the groundwater at the point of compliance.	WAC 173-200-080(5) (groundwater)			X		
	Practical quantification limit	The statistical test chosen must be conducted separately for each dangerous constituent in each well. Where practical quantification limits (PQL) are used in any of the following statistical procedures to comply with (i)(v) of this subsection, the PQL must be proposed by the owner or operator and approved by the department.	WAC 173-303-645(8)(h) (groundwater)			X	X	
	Practical quantification limit	Any practical quantification limit approved by the department under (h) of this subsection that is used in the statistical method must be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.	WAC 173-303-645(8)(i)(v) (groundwater)		X			
	Practical quantification limit	For sites with additional hazardous substances, which are deemed indicator hazardous substances under WAC 173-340-708(2) for which there is no value in Table 3 or applicable state and federal laws, cleanup levels for these additional hazardous substances shall be established at the natural background concentration or the practical quantification limit, subject to the limitations in this chapter.	WAC 173-340-745(2)(b) (solid waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantification limit	An emission unit or activity shall be considered insignificant if it qualifies under subsection (1)(b),(c) or (d) of this section, or if its actual emissions, based on methods approved by the permitting authority, are below the practical quantification limit (PQL), or are less than or equal to all the following threshold levels.	WAC 173-401-530(4) (air)			X		
	Practical quantitation limit	The lowest concentration that can be reliably measured within specified limits of precision, accuracy, representativeness, completeness, and comparability during routine laboratory operating conditions, using department approved methods.	WAC 173-340-200 (solid waste)	X				
	Practical quantitation limit	Method A cleanup levels for hazardous substances not addressed under applicable state and federal laws or Tables 1, 2, or 3, are established at concentrations which do not exceed the natural background concentration or the practical quantitation limit for the substance in question.	WAC 173-340-700(3)(a) (solid waste)			X		
	Practical quantitation limit	Where cleanup levels are below the practical quantitation limit, compliance with cleanup standards will be based upon the practical quantitation limit.	WAC 173-340-700(6) (solid waste)			X		
	Practical quantitation limit	Method A cleanup levels shall be at least as stringent as all of the following:…for individual hazardous substances not addressed under (a) and (b) of this subsection, concentrations that do not exceed natural background levels or the practical quantitation limit for the substance in question.	WAC 173-340-704(2)© (solid waste)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	The department recognizes that there may be situations where a hazardous substance is not detected or is detected at a concentration below the practical quantitation limit utilizing sampling and analytical procedure, which comply with the requirements of WAC 173-340-830. If those situations arise and the practical quantitation limit is higher than the cleanup level for that substance, the cleanup level shall be considered to have been attained, subject to subsection (4) of this section, only when the more stringent of the following conditions are met:	WAC 173-340-707(2) (solid waste)			X		
	Practical quantitation limit	The practical quantitation limit is no greater than ten times the method detection limit; or the practical quantitation limit for the particular hazardous substance, medium, and analytical procedure is no greater than the practical quantitation limit established by the United States Environmental Protection Agency and used to establish requirements in 40 CFR 136, 40 CFR 141 through 143, or 40 CFR 260 through 270.	WAC 173-340-707(2)(a)-(b) (solid waste)	X				
	Practical quantitation limit	In cases where a cleanup level required by this chapter is less than the practical quantitation limit using an approved analytical procedure, the department may also require one or more of the following: …use or development of specialized sample collection or analysis techniques to improve the method detection limit or practical quantitation limit for the hazardous substances at the site; or monitoring to assure that the concentration of a hazardous substance does not exceed detectable levels.	WAC 173-340-707(3)(b)-(c) (solid waste)			X	X	

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	When the practical quantitation limit is above the cleanup level, the department shall consider the availability of improved analytical techniques when performing periodic reviews under WAC 173-340-420. Subsequent to those reviews, the department may require the use of improved analytical techniques with lower practical quantitation limits and other appropriate actions.	WAC 173-340-707(4) (solid waste)			X	X	
	Practical quantitation limit	For purposes of estimating background concentrations, values below the method detection limit shall be assigned a value equal to one-half the method detection limit. Measurements above the method detection limit, but below the practical quantitation limit shall be assigned a value equal to the method detection limit. The department may approve the use of alternate statistical procedures for handling data below the method detection limit or practical quantitation limit.	WAC 173-340-708(11)(e) (solid waste)			X		
	Practical quantitation limit	For purposes of demonstrating compliance with groundwater cleanup levels, measurements below the method detection limit shall be assigned a value equal to one-half the method detection limit. Measurements above the method detection limit, but below the practical quantitation limit shall be assigned a value equal to the method detection limit. The department may approve the alternate statistical procedures for handling nondetected values or values below the practical quantitation limit.	WAC 173-340-720(8)(g) (groundwater)			X		

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	For purposes of demonstrating compliance, measurements below the method detection limit shall be assigned a value equal to one-half the method detection limit. Measurements above the method detection limit, but below the practical quantitation limit shall generally be assigned a value equal to the method detection limit. The department may approve the alternate statistical procedures for handling nondetected values or values below the practical quantitation limit.	WAC 173-340-730(7)(g) (water quality)			X		
	Practical quantitation limit	For sites with additional hazardous substances, which are deemed indicator hazardous substances under WAC 173-340-708(2) for which there is no value in Table 2 or applicable state and federal laws, cleanup levels for these additional hazardous substances shall be established at the natural background concentration or the practical quantitation limit, subject to the limitations in this chapter.	WAC 173-340-740(2)(b) (solid waste)			X		
	Practical quantitation limit	Where there is more than one method specified in subsection (4) of this section with a practical quantitation limit less than the cleanup standard, any of the methods may be selected. In these situations, considerations in selecting a particular method may include confidence in the data, analytical costs, and considerations relating to quality assurance or analysis efficiencies.	WAC 173-340-830(3)(a) (solid waste)			X		
	Practical quantitation limit	The methods used for sample collection, sample preservation, transportation, allowable time before analysis, sample preparation, analysis, method detection limits, practical quantitation limits, quality control, quality assurance, and other technical requirements and specifications shall comply with the following requirements, as applicable.	WAC 173-340-830(4)(a) (solid waste)					X

Terms Used for Analytical Detection and Quantification Limits in State Environmental Regulations (Selected States)

State	Term	Regulatory Language	Citation	Use				
				Definition	NPDES Permit Limits	Compliance	Alternative Limits	Other
	Practical quantitation limit	The groundwater monitoring program must include sampling and analytical methods that are appropriate for groundwater sampling and that accurately measure hazardous constituents and other monitoring parameters in groundwater samples or reflect an acceptable practical quantitation limit.	WAC 173-351-410(2) (groundwater)					X
	Practical quantitation limit	The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantitation limit (PQL) that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.	WAC 173-351-420(3)(e) (groundwater)	X		X		

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