Small POTWs: What to Expect and How to Prepare for your NPDES Permit

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This presentation was developed by staff (and contractors) within the U.S. Environmental Protection Agency's (EPA's) Office of Wastewater Management and addresses development of wastewater discharge permits under the National Pollutant Discharge Elimination System (NPDES). NPDES permit development is governed by existing requirements of the Clean Water Act (CWA) and the NPDES implementing regulations. CWA provisions and regulations contain legally binding requirements. This presentation does not substitute for those provisions or regulations.

The information in this presentation has been reviewed for technical accuracy; however, the views of the speakers are their own and do not necessarily reflect those of EPA. Recommendations and information in this presentation are not binding; the permitting authority may consider other approaches consistent with the CWA and EPA regulations. This presentation incorporates, and does not modify, existing EPA policy and guidance on developing NPDES permits. EPA may change this presentation in the future.

What Are We Covering?

- NPDES Permits
- Pollution Standards
- NPDES Applications
- Secondary Treatment
- Water Quality Based Effluent Limitations
- Critical Conditions
- Reasonable Potential
- Effluent Limitations
- Final Limitations
- Monitoring and Reporting
- Special Conditions
- Standard Conditions
- Administrative Process

Presenters

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NPDES Permits

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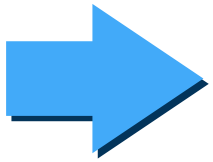
Point Source Permit Requirements

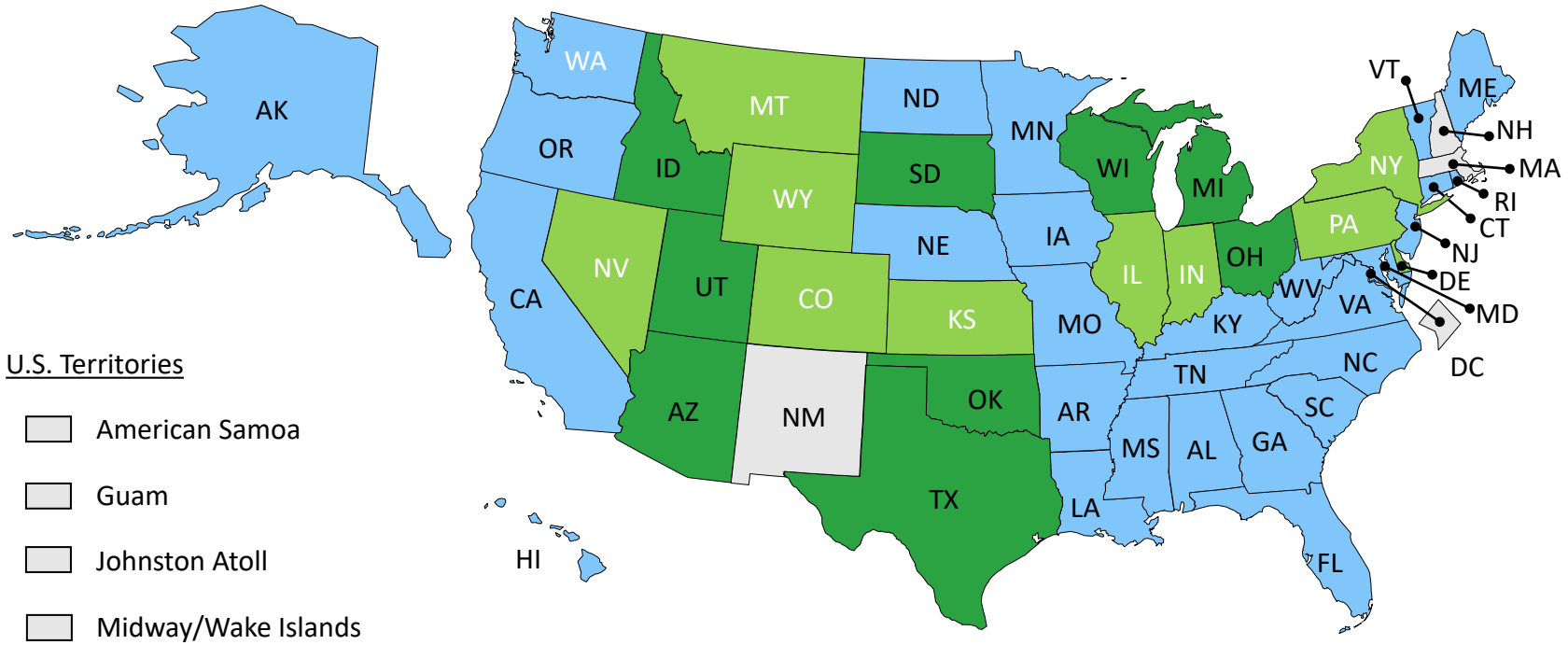
- All "point" sources
- "Discharging pollutants"
- Into "waters of the United States"



Must obtain a discharge permit from EPA or an authorized State

National Pollutant Discharge Elimination System Permit Program
Clean Water Act Section 402

NPDES Program Authorizations



U.S. Territories

- American Samoa
- Guam
- Johnston Atoll
- Midway/Wake Islands
- Northern Mariana Islands
- Puerto Rico
- Virgin Islands

State NPDES Program Status

- Fully authorized (approved pretreatment and biosolids program)
- Fully authorized (approved pretreatment program, no approved biosolids program)
- Partially authorized (no approved pretreatment or biosolids program)
- Unauthorized

POTWs

Publicly Owned Treatment Works are treatment works **owned by a state or municipality** and include devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial wastes of a liquid nature [40 CFR 403.3(q)]

For POTWs, major facilities are those that:

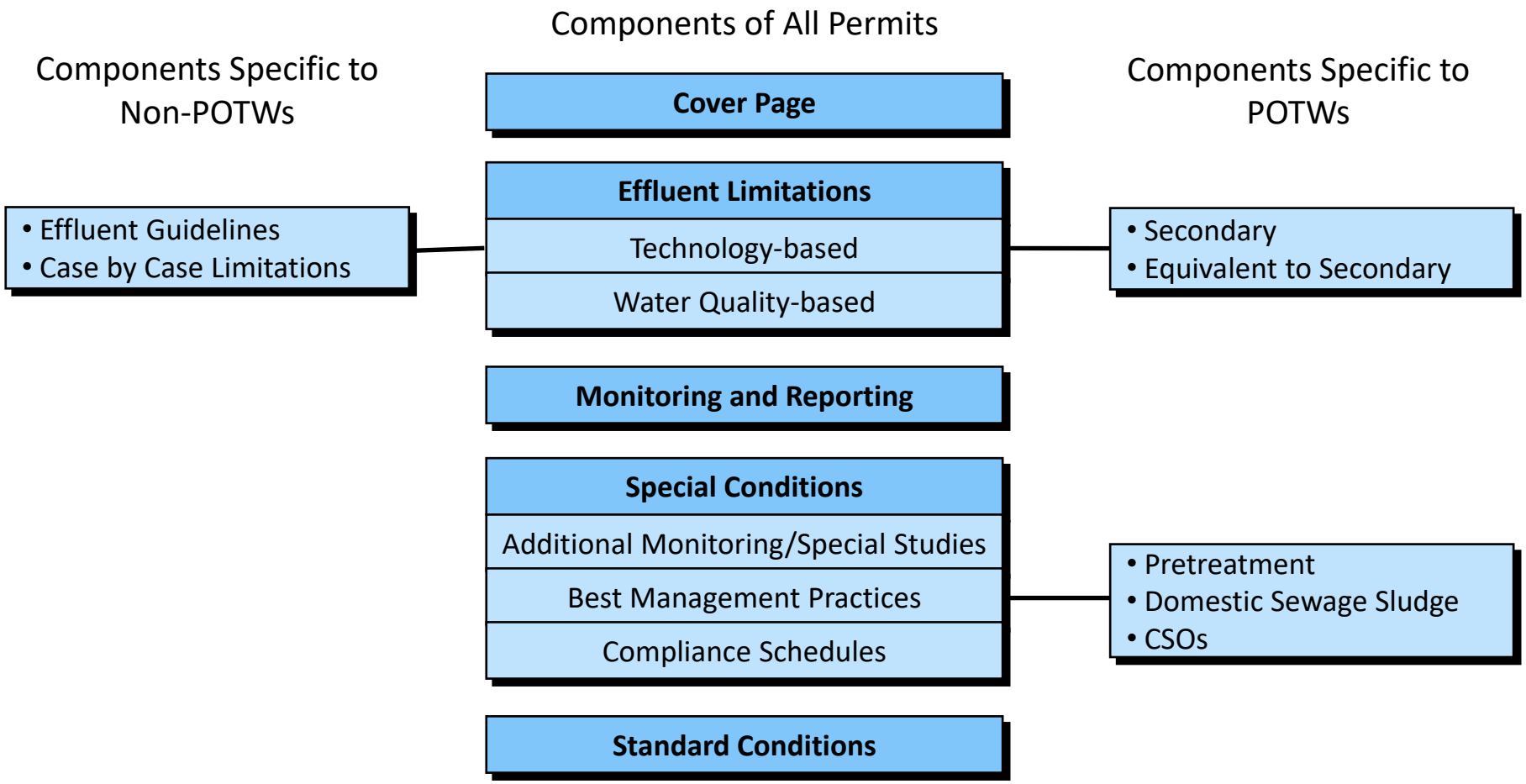
- have a design flow of one million gallons per day or greater or
- serve a population of 10,000 or more or
- cause significant water quality impacts.

Type of Permit	Facility Category	Approximate Number of Facilities
Individual	Major POTWs	4,300
	"Minor" POTWs	10,000

POTWs – Environmental Concerns and Permitting Challenges

- Domestic wastewater pollutants
- Industrial and commercial contributions
- Biosolids (sewage sludge)
- Inflow and Infiltration Issues
- Combined sewer systems and overflows
- Sanitary sewer overflows
- Stormwater runoff (from POTW site)
- New technologies:
  - nutrient treatment
  - energy recovery
  - water reuse

NPDES Permit Components



Basics Steps in NPDES Permit Process

1. Application
2. Development of Technology-based Effluent Limitations
3. Development of Water Quality Based-Effluent Limitations
4. Monitoring and Reporting Conditions
5. Special and Standard Conditions
6. Public Notice of Draft Permit & Fact Sheet
7. Public Comment/ Hearing
8. Final Permit Decision
9. Administrative and Judicial Appeals

Take Home Message

- The NPDES program has consistent regulatory requirements, but state programs may have differences in how those are applied during the permitting process as well as state specific requirements.

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Pollution Standards

Pollutant

The Clean Water Act defines a pollutant as:

dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal and agricultural waste discharged into water

- Conventional pollutants
  - BOD, TSS, pH, fecal coliform, and oil and grease
- Toxic pollutants – 65 categories (126 priority pollutants)
  - heavy metals and organic compounds
- Nonconventional pollutants
  - everything else (e.g., chlorine, ammonia, nitrogen, phosphorus)

Technology- and Water Quality-based Standards

	Technology-based Standards	Water Quality-based Standards
Goal or Policy:	▪ Zero Discharge of Pollutants	▪ Fishable and Swimmable Waters ▪ No Toxics in Toxic Amounts
Standards:	▪ Secondary Treatment Standards ▪ Pretreatment Standards	▪ 304(a) Recommended Criteria ▪ Water Quality Standards
Uses:	▪ NPDES Permits ▪ Pretreatment Program	▪ NPDES Permits ▪ Water Quality Assessments and TMDLs ▪ State Certification ▪ Nonpoint Source Programs

Secondary Treatment Standards

- Secondary Treatment Standards
  - Technology standards that apply to POTWs.
  - Establish minimum controls for Biological Oxygen Demand, Total Suspended Solids, Percent Removal of BOD and TSS and pH
  - Can be adjusted to address use of trickling filters or waste stabilization ponds/lagoons.
    - Equivalent to Secondary Standards
    - State Adjusted Standards.

State Water Quality Standards

WQS Components	Examples
Designated Uses	Aquatic Life, Recreation, Drinking water supply, Agricultural Uses, Industrial Uses
Water Quality Criteria	Chemical Specific Numeric Criteria, Narrative Prohibitions (Free Froms), Whole Effluent Toxicity, Biological Criteria
Antidegradation Policy	Existing Use, High Quality Waters, Outstanding National Resource Waters
General Policies	Mixing Zones, Variances, Low Flows, Compliance Schedules

- States develop Water Quality Standards that are approved by EPA.
- EPA develops national 304(a) recommended water quality criteria to assist States with setting criteria and as a standard for EPA to evaluate the State WQS against.

Pretreatment Standards

- The purpose of the pretreatment program is:
  - To prevent the introduction of pollutants into sewage treatment plants which will interfere with plant operations or pass through untreated.
  - To improve opportunities to recycle and reclaim wastewaters and sludges.
  - To protect sewage treatment plant workers.
- Pretreatment Standards
  - Apply to nondomestic dischargers into a domestic sewage treatment plant.
  - Establish minimum level of performance to prevent upset at the treatment plant or pass through of pollutants.
- Pretreatment Standards are expressed as:
  - General and Specific Prohibitions
  - Categorical standards
  - Local pretreatment standards

Take Home Message

- Permit Limits are based upon Technology and Water Quality Standards and is important to understand and discuss the available flexibilities as they apply to your permit.

NPDES Applications

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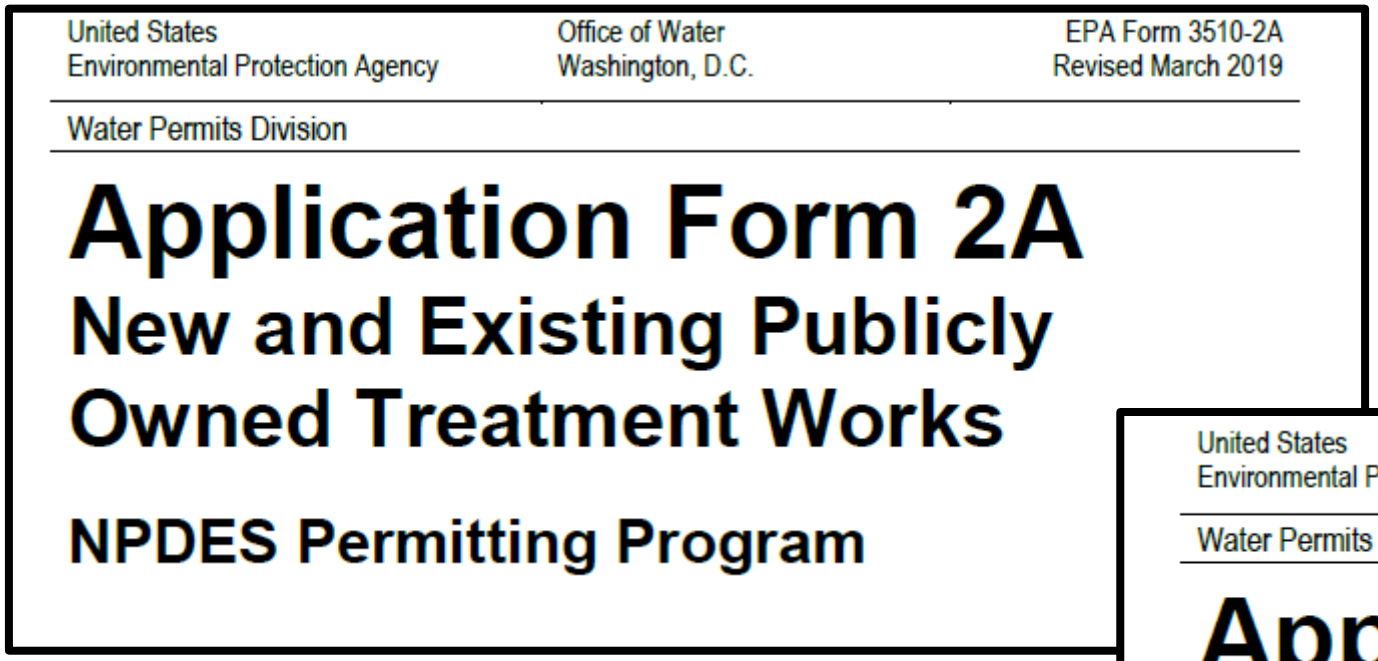
Application Forms

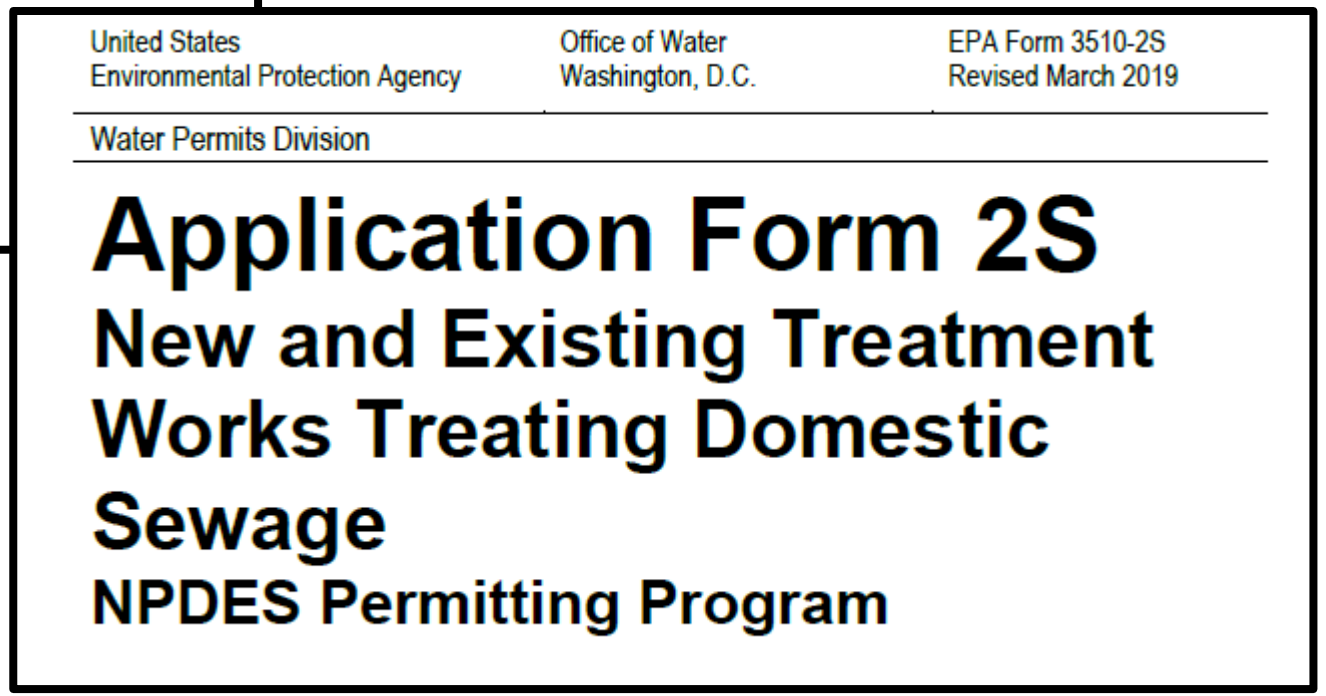

United States Environmental Protection Agency | Office of Water Washington, D.C. | EPA Form 3510-2A Revised March 2019

Water Permits Division

Application Form 2A

New and Existing Publicly Owned Treatment Works

NPDES Permitting Program


United States Environmental Protection Agency | Office of Water Washington, D.C. | EPA Form 3510-2S Revised March 2019

Water Permits Division

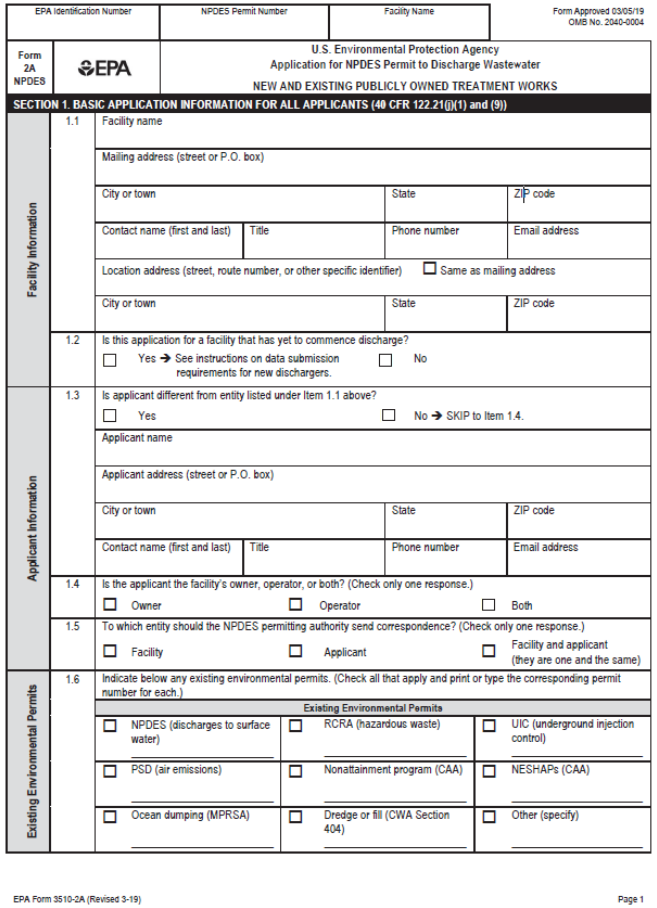
Application Form 2S

New and Existing Treatment Works Treating Domestic Sewage

NPDES Permitting Program

Form 2A – Basic Requirements

- Facility and applicant information (e.g., name, address, contact information)
- Collection system type, areas served, and total population served
- Discharges and other disposal methods
- Description of outfalls, receiving waters, and treatment
- Effluent testing data (flow, temperature, pH, BOD, TSS, fecal coliform)
- Certification and signature



EPA Identification Number	NPDES Permit Number	Facility Name	Form Approved 03/05/19 OMB No. 2040-0004

Form 2A NPDES — EPA

U.S. Environmental Protection Agency
Application for NPDES Permit to Discharge Wastewater
NEW AND EXISTING PUBLICLY OWNED TREATMENT WORKS

SECTION 1. BASIC APPLICATION INFORMATION FOR ALL APPLICANTS (40 CFR 122.21(j)(1) and (9))

Facility Information

1.1 Facility name

Mailing address (street or P.O. box)

City or town | State | ZIP code

Contact name (first and last) | Title | Phone number | Email address

Location address (street, route number, or other specific identifier) ☐ Same as mailing address

City or town | State | ZIP code

1.2 Is this application for a facility that has yet to commence discharge?
☐ Yes → See instructions on data submission requirements for new dischargers. ☐ No

Applicant Information

1.3 Is applicant different from entity listed under Item 1.1 above?
☐ Yes ☐ No → SKIP to Item 1.4.

Applicant name

Applicant address (street or P.O. box)

City or town | State | ZIP code

Contact name (first and last) | Title | Phone number | Email address

1.4 Is the applicant the facility's owner, operator, or both? (Check only one response.)
☐ Owner ☐ Operator ☐ Both

1.5 To which entity should the NPDES permitting authority send correspondence? (Check only one response.)
☐ Facility ☐ Applicant ☐ Facility and applicant (they are one and the same)

Existing Environmental Permits

1.6 Indicate below any existing environmental permits. (Check all that apply and print or type the corresponding permit number for each.)

Existing Environmental Permits

☐ NPDES (discharges to surface water)	☐ RCRA (hazardous waste)	☐ UIC (underground injection control)
☐ PSD (air emissions)	☐ Nonattainment program (CAA)	☐ NESHAPs (CAA)
☐ Ocean dumping (MPRSA)	☐ Dredge or fill (CWA Section 404)	☐ Other (specify)

EPA Form 3510-2A (Revised 3-19) Page 1

Form 2A – Additional Data Requirements

- Facilities with design flow > 0.1 mgd
  - inflow and infiltration estimates
  - topo map, process flow diagram, and information on contractor performing operation and maintenance
  - data for certain conventional and nonconventional pollutants (e.g., TDS, chlorine, dissolved oxygen, oil and grease)
- Facilities with design flow > 1.0 mgd or required to have a pretreatment program
  - three priority pollutant scans
  - at least four whole effluent toxicity test results
- For some POTWs
  - information on industrial users
  - information on combined sewer systems

Form 2S – Treatment Works Treating Domestic Sewage

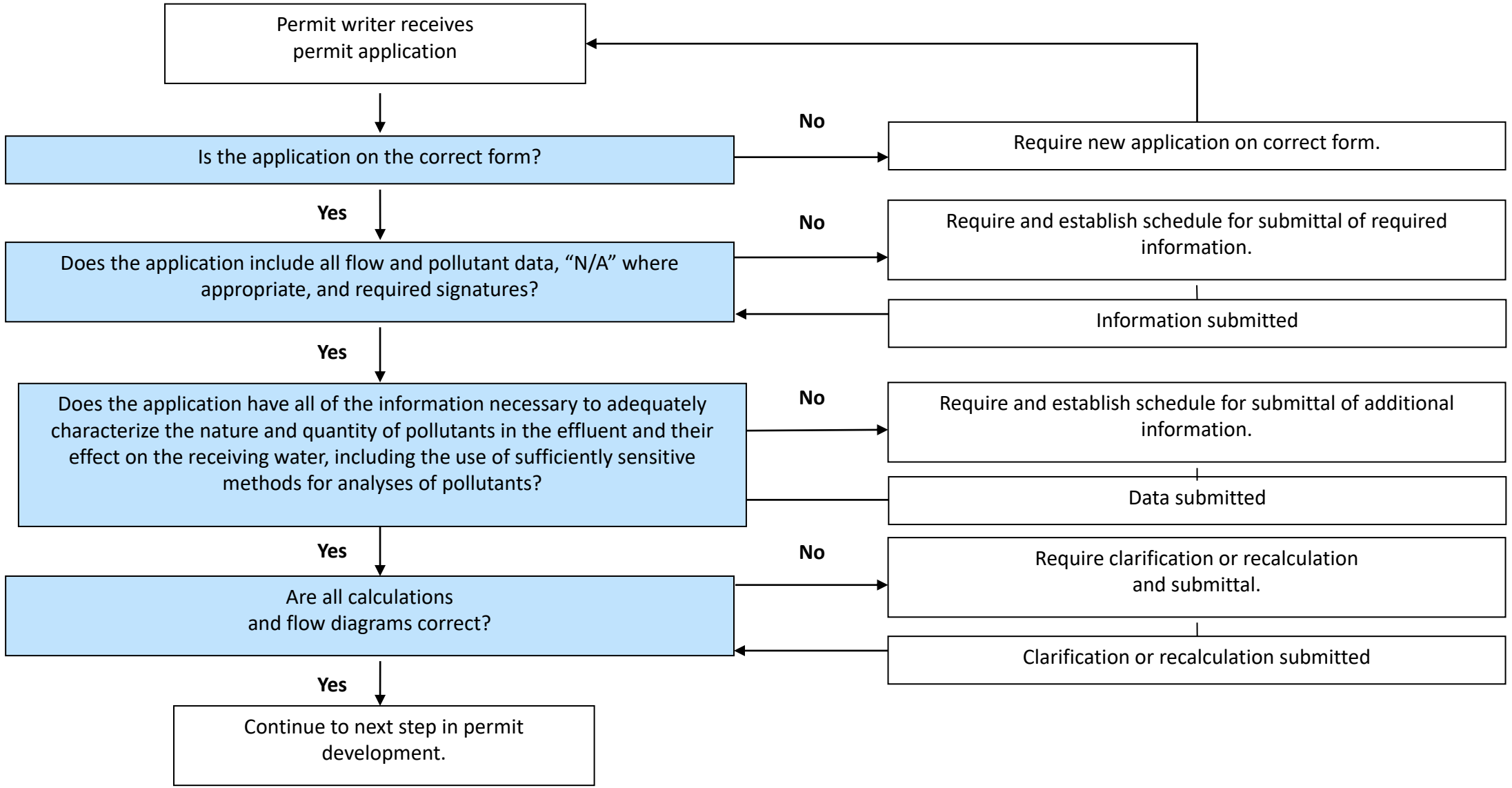
- Form 2S is required if an entity own or operates a treatment works treating domestic sewage (TWTDS).
  - *Treatment works treating domestic sewage* means a POTW or any other sewage sludge or waste water treatment devices or systems, regardless of ownership (including federal facilities), used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated for the disposal of sewage sludge.

- All generators of sewage sludge that are regulated by 40 CFR 503 (i.e., it is applied to the land, placed on a surface disposal site, fired in a sewage sludge incinerator, or placed in a municipal solid waste landfill unit) are required to apply using Form 2S.
  - If you are a sludge only facility, you only have to submit Part 1 of Form 2S (i.e. does not have a direct discharge of wastewater.)
  - If you are a TWTDS and discharge wastewater to surface water, you must submit Part 2 of Form 2S. The instructions also direct the TWTDS to complete NPDES application Form 2A.
- Sewage Sludge Amounts and Pollutant Concentrations
- Sewage Sludge Use or Disposal Practice

Form 2S – Treatment Works Treating Domestic Sewage

- Part 1 Requirements
  - Facility and applicant information (e.g., name, address, contact information)
  - Sewage Sludge Amounts and Pollutant Concentrations
  - Sewage Sludge Use or Disposal Practice
  - Certification and signature
- Part 2 Requirements
  - Facility and applicant information (e.g., name, address, contact information)
  - Sewage Sludge Amounts and Pollutant Concentrations
  - Sewage Sludge Use or Disposal Practice – Specific Sections for
    - Land Application
    - Surface Disposal
    - Incineration
  - Certification and signature

Permit Application Review



Take Home Message

- Application Forms may differ but two important points…

1. Ask for assistance if you are not sure how to fill out a form.
2. More data generally leads to a permit that better addresses your effluent.

Secondary Treatment

- NPDES Permits
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Technology-based Requirements in NPDES Permits for POTWs

- 40 CFR 122.44(a) and 125.3 require NPDES permits for POTWs to include technology-based effluent limitations based on secondary treatment standards found in 40 CFR Part 133.
- **Equivalent to Secondary Standards – § 133.105**
  - Federal regulations allow adjustments to the secondary treatment requirements for BOD_5 and TSS for *equivalent to secondary* facilities
  - Facilities with certain types of treatment processes might qualify
    - trickling filters
    - waste stabilization ponds/lagoons
- State Adjusted Equivalent to Secondary Standards
  - Applicable to same types of facilities as equivalent to secondary

Facilities Eligible for Equivalent to Secondary Standards – § 133.101(g)

Equivalent to secondary standards may be applied to facilities where:

1. a trickling filter or waste stabilization pond is the principal process
2. the BOD_5 and TSS concentrations consistently achievable with proper O&M exceed [i.e., do not attain] secondary treatment requirements [defined in § 133.101(f)]
   - Limits are specified as "not to exceed" and based upon actual performance.
   - facilities operating beyond capacity do not qualify
3. the facility provides significant biological treatment of municipal wastewater [BOD_5 removal $\geq$ 65% as defined in § 133.101(k)]

State Adjustments to BOD_5 and TSS Requirements

States, territories, and tribes may further adjust the maximum concentration standards for equivalent to secondary facilities:

- Alternative State Requirements (ASRs) to address climatic or geographic conditions and their effects on performance [§ 133.105(d)]
  - trickling filters – BOD_5 and TSS
  - waste stabilization ponds – BOD_5
- Regulations promulgated in October 1977 allowed special consideration for TSS requirements applicable to waste stabilization ponds [§ 133.103(c)]*

  *originally only for ponds with flows of < 2 MGD; cap removed in 1984

Additional Adjustments

- Pollutant parameter substitution
  - substitution of $CBOD_5$ for BOD_5 [§ 133.102(a)(4)]
  - substitution of COD or TOC for BOD_5 [§ 133.104(b)]
- Special considerations for certain influent characteristics
  - modification of BOD_5 and TSS requirements for POTWs with large industrial contributions [§ 133.103(b)]
- Modification of percent removal requirement for some POTWs
  - adjustment or deletion for POTWs with less concentrated influent received from combined sewers during wet weather [§ 133.103(a)]
  - adjustment or substitution of mass limit for POTWs with less concentrated influent from separate sewer systems or from combined sewers during dry weather [§ 133.103(d), § 133.103(e)]

Numeric Standards

Parameter	Secondary Treatment Standards – § 133.102		Equivalent to Secondary Standards – § 133.105		Adjusted Equivalent to Secondary Standards – §§ 133.103(c) and 133.105(d)	
	7-Day Average	30-Day Average	7-Day Average	30-Day Average	7-Day Average	30-Day Average
5-Day Biochemical Oxygen Demand (BOD_5)	45 mg/L (40 mg/L $CBOD_5$)	30 mg/L (25 mg/L [$CBOD_5$])	Not to exceed 65 mg/L (60 mg/L $CBOD_5$)	Not to exceed 45 mg/L (40 mg/L $CBOD_5$)	Not to exceed maximum established by ASRs	
Total Suspended Solids (TSS)	45 mg/L	30 mg/L	Not to exceed 65 mg/L	Not to exceed 45 mg/L	Not to exceed maximum established by ASR (trickling filters) or special adjustment for ponds	
Removal	85% BOD_5 (or $CBOD_5$) and TSS		As low as 65% BOD_5 (or $CBOD_5$) and TSS		As low as 65% BOD_5 (or $CBOD_5$) and TSS	
pH	Maintained within the limits of 6.0 – 9.0 standard units*					

* Unless the POTW demonstrates that inorganic chemicals are not added to waste stream as part of treatment process and that contributions from industrial sources do not cause pH to be out of the specified range

Note: Compliance Deadline was 7/1/88

Calculate Secondary Treatment Limitations Using Applicable Standards

- Limits expressed as **average monthly and average weekly** limits for POTWs unless impracticable [§ 122.45(d)(2)]
- BOD_5 and TSS limits should be **concentration-based** (at a minimum) because secondary treatment standards are expressed in concentration units [§ 122.45(f)(1)(ii)]
- Concentration limits often supplemented by **mass loading limits**
  - Use **design flow** of POTW to calculate mass loading limitations if used to supplement concentration limitations [§ 122.45(b)]

Take Home Message

- Equivalent to Secondary Treatment effluent limitations are based upon your facility performance…more data better describes your effluent variability and leads to the most appropriate limitations.

Water Quality Based Effluent Limitations

- NPDES Permits
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Why Do We Need WQBELs?

- Waters Not Attaining Water Quality Standards
  - prevent further degradation
  - implement corrective actions (e.g., TMDLs) to restore waters and meet water quality standards
- Waters Attaining Water Quality Standards
  - protect beneficial uses of the water body
  - prevent future excursions of water quality standards
  - prevent or limit degradation of water quality
- Section 301(b)(1)(C)
  - requires compliance with effluent limitations necessary to meet water quality standards

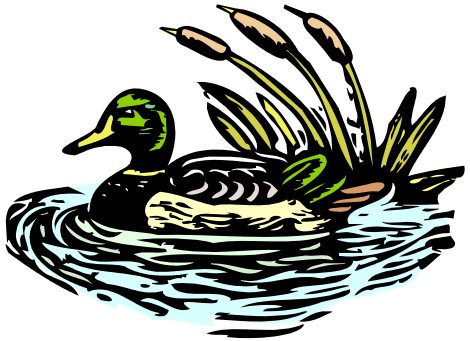
Components of WQS

Designated uses (§ 131.10)

Water quality criteria (§ 131.11)

Antidegradation policy (§ 131.12)

General policies – optional (§ 131.13)



Designated Uses – § 131.10

- Water quality standards must specify appropriate uses to be achieved and protected
- Common use categories
  - aquatic life protection and propagation
  - wildlife protection and propagation
  - recreation
    - primary contact
    - secondary contact
  - public water supply
  - agricultural water supply
  - industrial water supply
  - navigation

Water Quality Criteria – § 131.11

- Numeric chemical- or parameter-specific
  - aquatic life – acute and chronic
  - human health
  - others (e.g., wildlife)
- Whole effluent toxicity (WET)
- Biological
- Narrative

Whole Effluent Toxicity (WET)

Measures the aggregate toxic effect of effluent

- exposes aquatic test organisms directly to an effluent
- measures lethal and sub-lethal effects
- uses standard EPA test methods
  - freshwater
  - saltwater

- https://www.epa.gov/npdes/whole-effluent-toxicity-wet
- http://www.epa.gov/cwa-methods/whole-effluent-toxicity-methods
- https://www.epa.gov/npdes/npdes-whole-effluent-toxicity-wet-training

Narrative Criteria

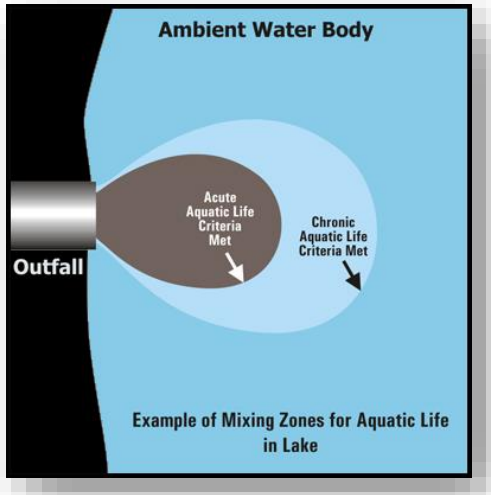
Statements that describe the desired water quality goal, often expressed as ***free from*** statements. **For example:**

- All waters must be ***free from*** toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life
- All waters must be ***free from*** discoloration that causes nuisance or adversely affects designated uses
- All waters must be ***free from*** nutrients at levels causing excessive algal growth that impairs any designated use

General WQS Policies – § 131.13

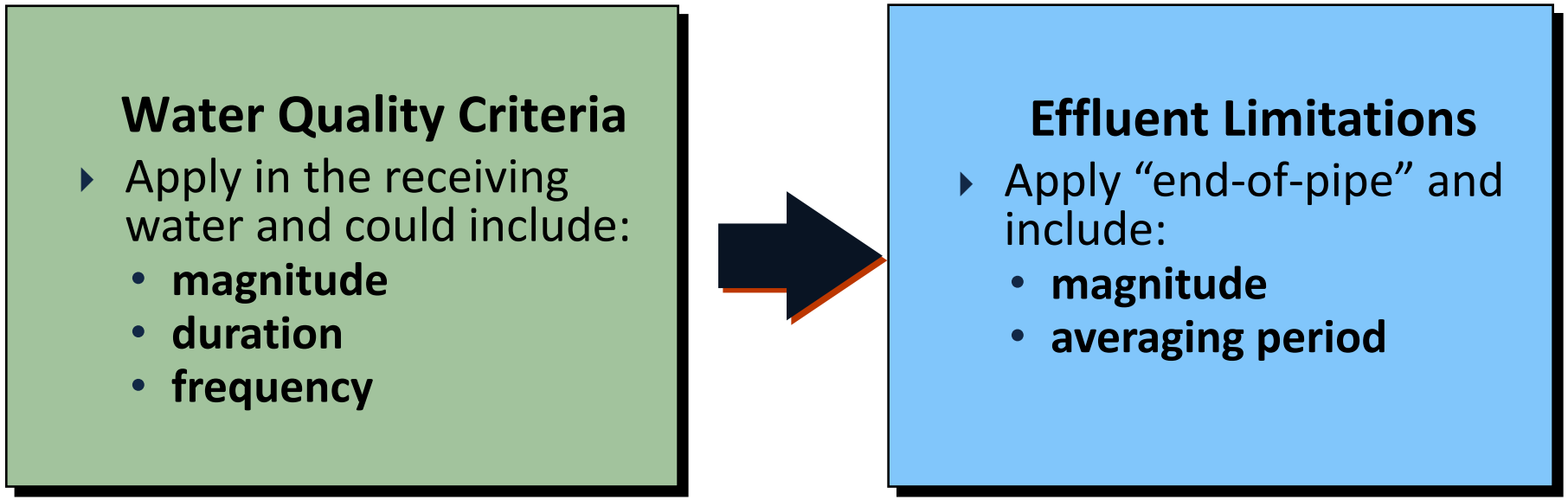
States, territories, and tribes may include in their standards, at their discretion, policies affecting *water quality standards application and implementation*, such as

- mixing zones
- low flows
- variances



Relationship Between WQS and Effluent Limitations

- Calculate **end-of-pipe WQBELs** where necessary to ensure that **water quality standards** are attained in the receiving water
- Use water quality standards implementation procedures



Take Home Message

- Water Quality standards protect the designated uses of the waterbody and are implemented typically through a statistical process to develop permit limitations.

Critical Conditions for the Discharge

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Step 1: Identify Pollutants of Concern

- Pollutants of concern (POCs) are any pollutants or pollutant parameters that:
  - permit writer has reason to believe are or may be discharged by the facility, and;
  - could affect or alter the physical, chemical, or biological condition of the receiving water
- POCs are not limited to those parameters covered by technology standards

What information does the permit writer have to build a list of POCs?

The Permit Writer would consider pollutants:

- with an applicable TBEL
- identified as present in the effluent through monitoring
- identified as needing WQBELs in the previous permit
- discharged to a waterbody impaired for that pollutant
- with a WLA from a TMDL
- otherwise expected to be present in the discharge

Step 2: Identify Critical Conditions for Effluent and Receiving Water Modeling

- Effluent critical conditions:
  - effluent flow
  - effluent pollutant concentrations (pollutants of concern)
- Receiving water critical conditions:
  - receiving water flow (if applicable)
  - background pollutant concentrations (pollutants of concern)
  - hardness (some metals criteria)
  - other receiving water characteristics (e.g., temperature, pH, reaction rates)
- Critical conditions might depend on when impacts are expected to occur (i.e., dry weather, wet weather, or both)
- Dilution Allowances or Mixing Zones

Take Home Message

- The Pollutant of Concern list does not mean you will get a limit…it just means the pollutant will be considered for limits.

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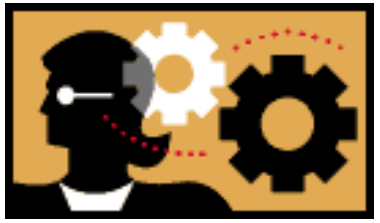
Reasonable Potential

Determining the Need for WQBELs



Water Quality Based Effluent Limitations

[40 CFR 122.44(d)(1)(ii)]

When determining whether a discharge causes, *has the reasonable potential to cause*, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for:

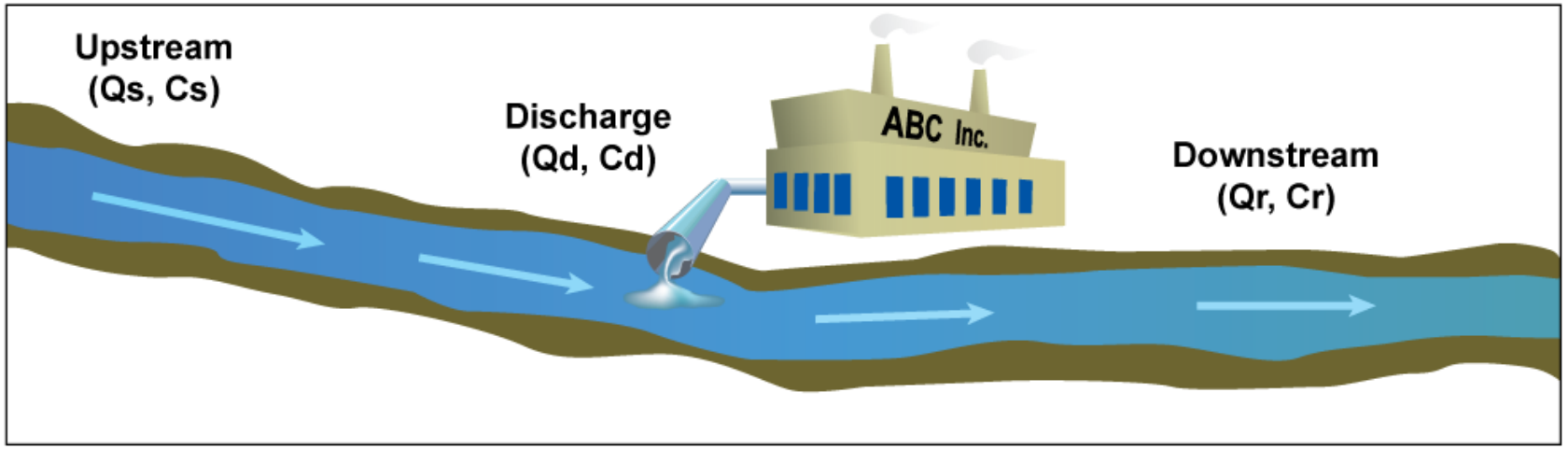
- existing controls on point and nonpoint sources of pollution
- the variability of the pollutant or pollutant parameter in the effluent
- the sensitivity of the species to WET testing
- where appropriate, the dilution of the effluent in the receiving water

Reasonable Potential Analysis (RPA)

- We can conduct a "reasonable potential analysis" based on:
  - numeric criteria
  - narrative criteria
    - numeric interpretation
    - qualitative interpretation
- A reasonable potential analysis can be completed:
  - with effluent data
  - Without effluent data
- Most of the processes were developed for toxic pollutants but are often used for conventional and nonconventional pollutants unless another approach is provided.

Reasonable Potential Analysis – *Steady-State, Complete Mixing Under Critical Conditions*

Determine the pollutant concentration of Pollutant X (the pollutant of concern) in the water body downstream of the discharge:



$$Q_s C_s + Q_d C_d = Q_r C_r \quad \Rightarrow \quad C_r = \frac{Q_s C_s + Q_d C_d}{Q_r}$$

Mass Balance Equation

Determining a Critical Value for C_d

Examine data for ABC Incorporated

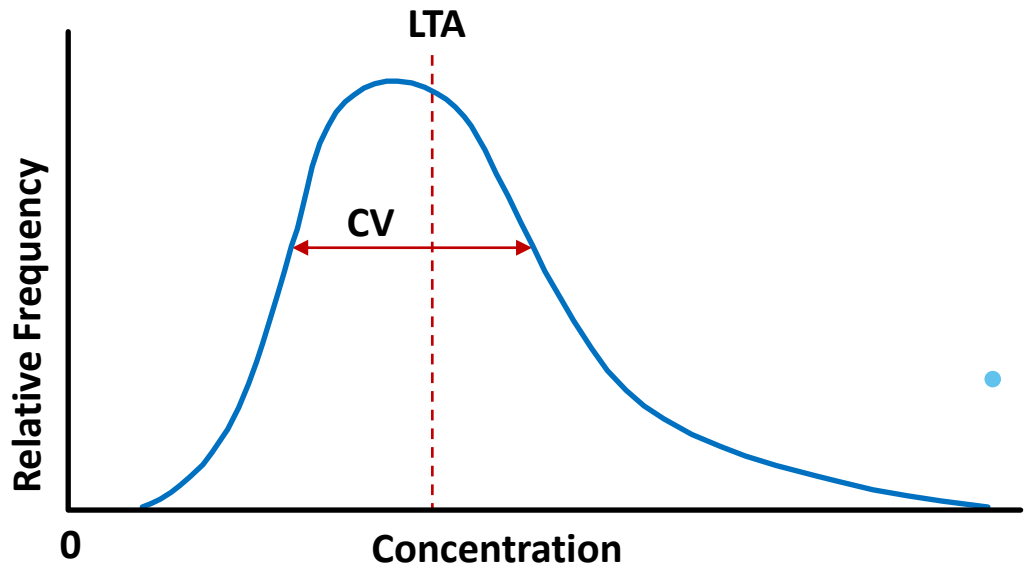
- Number of samples **(N) = 6**
- Concentrations of Pollutant X:

$C_d(1) = 1.2$ mg/L
$C_d(2) = 0.92$ mg/L
$C_d(3) = 0.87$ mg/L
$C_d(4) = 1.3$ mg/L
$C_d(5) = 0.74$ mg/L
$C_d(6) = 1.0$ mg/L

- Maximum Observed Effluent Concentration **= 1.3 mg/L**

Question: ***Would this C_d represent the "critical" condition?***

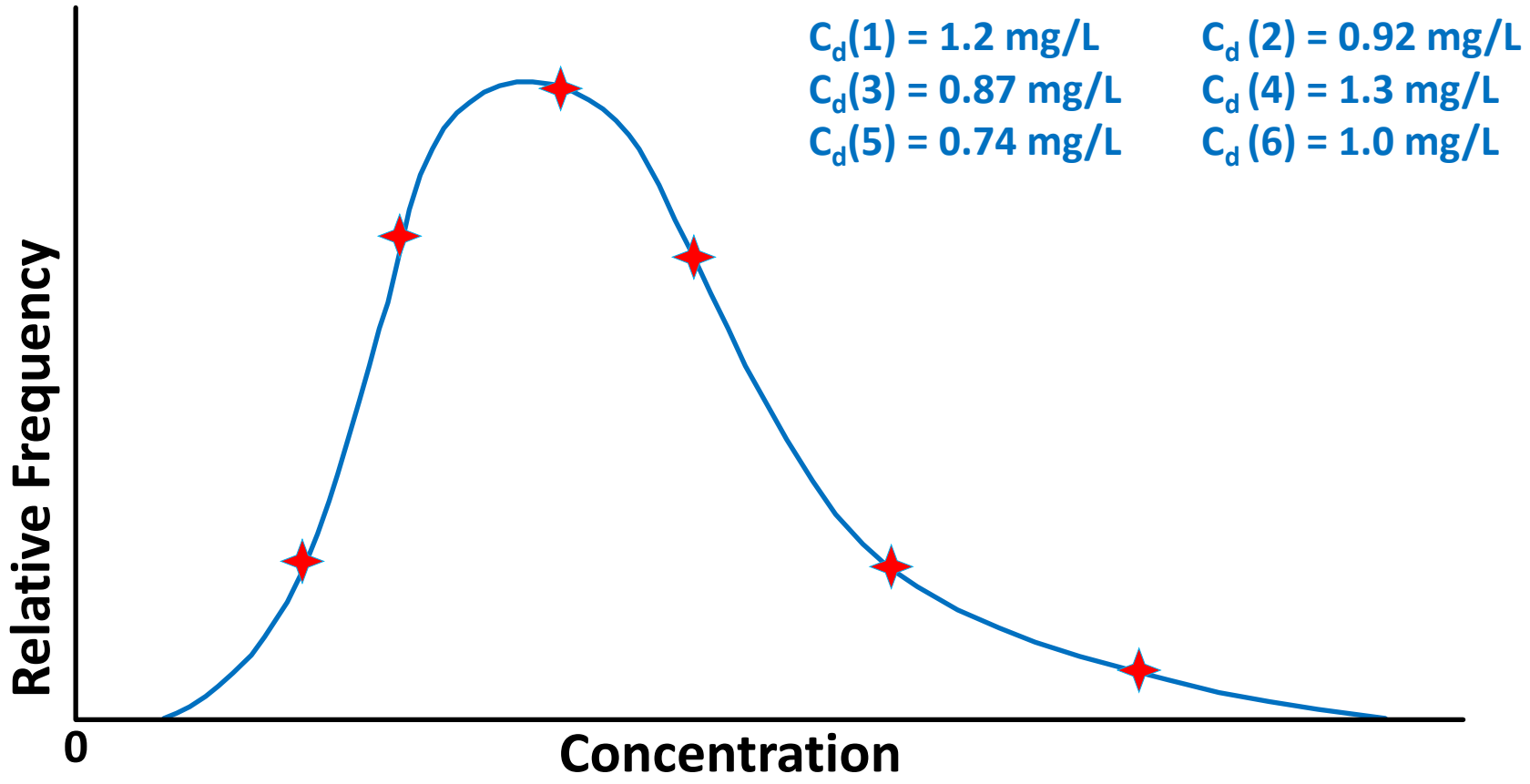
Defining a Lognormal Distribution



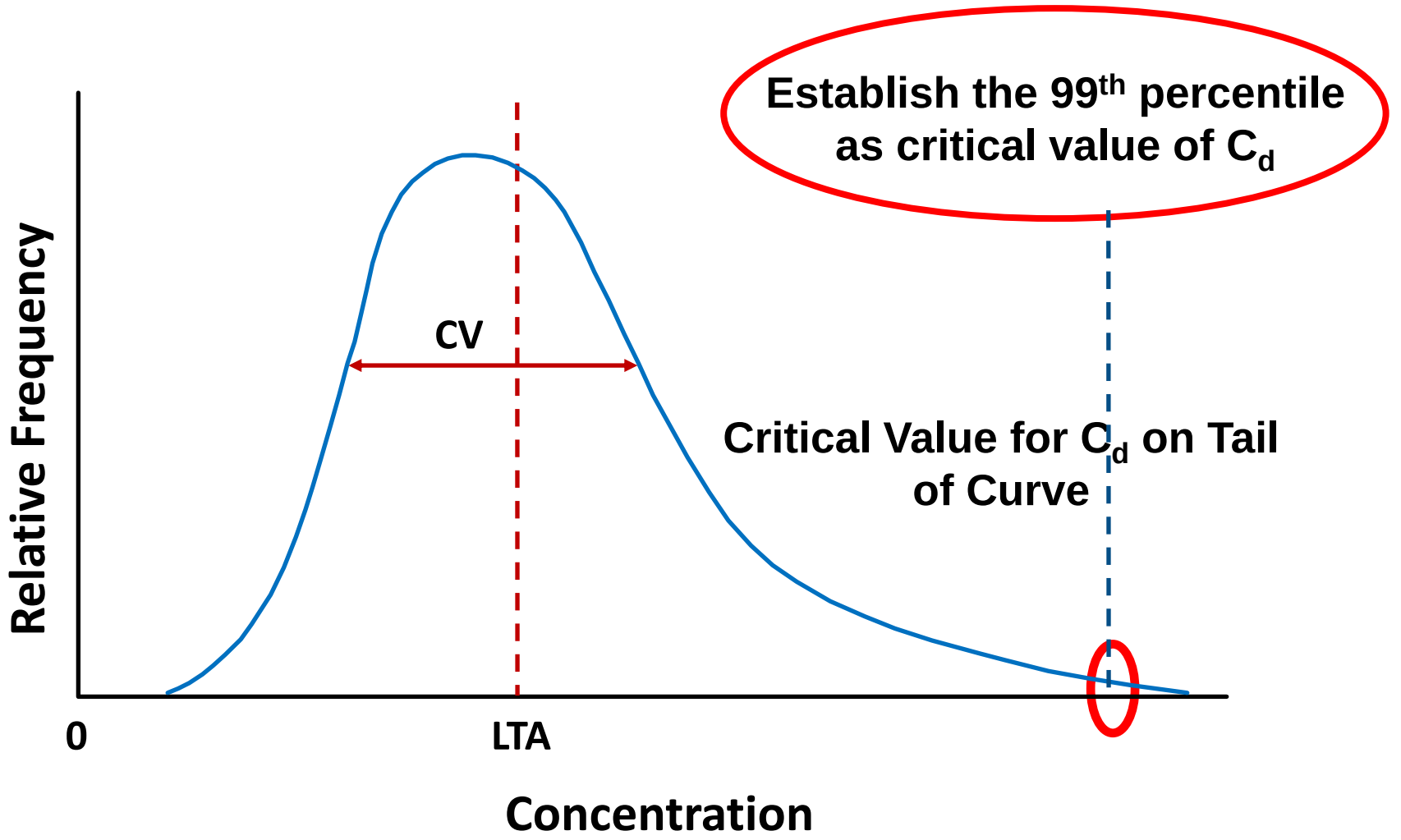
- *Long-term Average (LTA)*: for a continuous random variable, the value at which the area under the distribution curve to the left of the value equals the area under the distribution curve to the right of the value
- *Coefficient of Variation (CV)*: a statistical measure of the relative variation of a distribution or set of data calculated as the standard deviation divided by the mean

Lognormal Distribution – Our Data

So what would a graph of this data look like on a lognormal distribution?

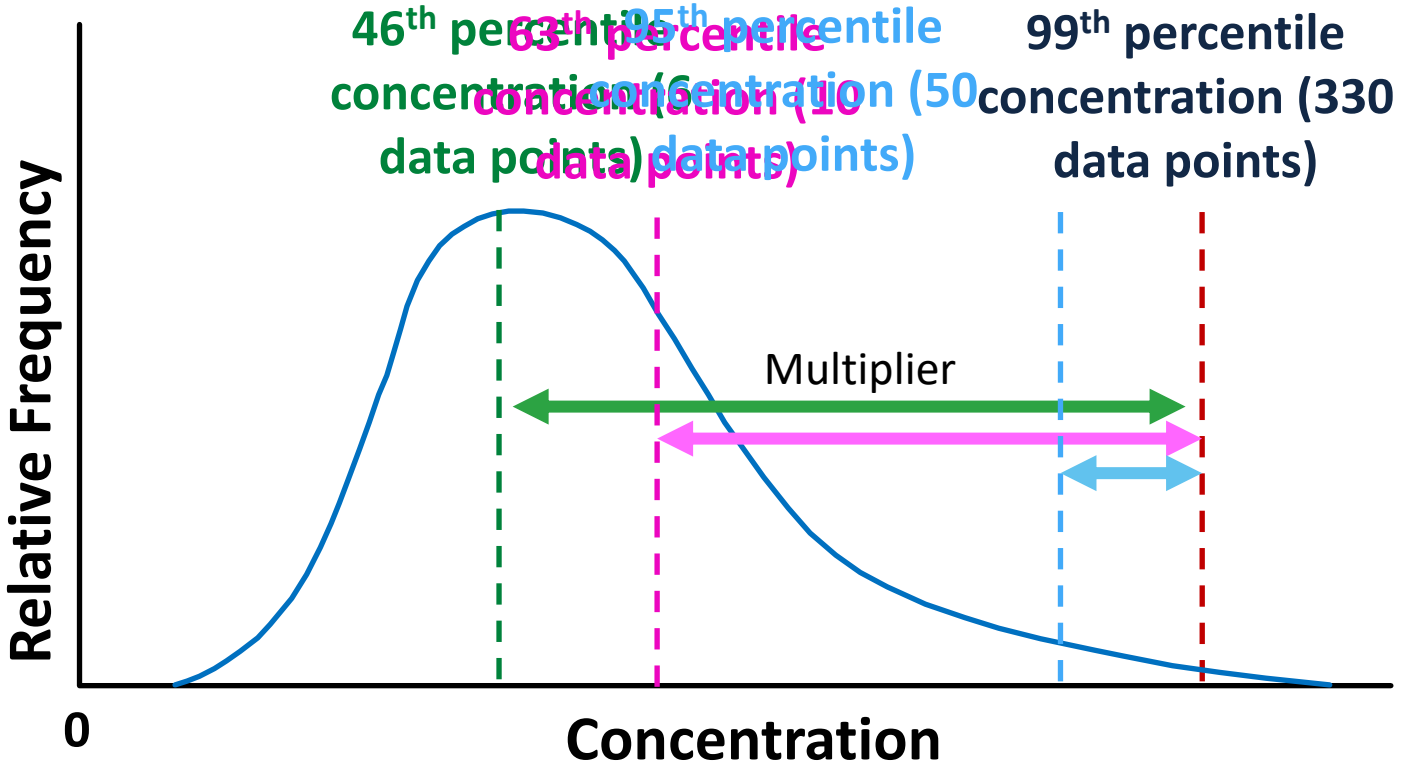


Determining a Critical Value for C_d



Determining a Critical Value for C_d

So using statistics and looking at differences in concentration values between the 46th percentile and the 99th percentile for known data sets, we can come up with a multiplier that can estimate the 99th percentile when we only know the 46th percentile.



Determining a Critical Value for C_r

Projected Critical (99th percentile) Value of C_d =

1.3 mg/L x multiplier

= 1.3 mg/L x 3.8 = **4.9 mg/L**

$$C_r = \frac{(1.2 \text{ cfs})(0.80 \text{ mg/L}) + (0.31 \text{ cfs})(4.9 \text{ mg/L})}{}$$

$$C_r = 1.6 \text{ mg/L}$$

For ABC Incorporated:

- Projected C_r = **1.6 mg/L > 1.0 mg/L** (acute criterion)
- The discharge of Pollutant X from ABC Incorporated would cause, have the reasonable potential to cause, or contribute to an excursion of the acute aquatic life criterion.

The permit writer must calculate WQBELs for Pollutant X.

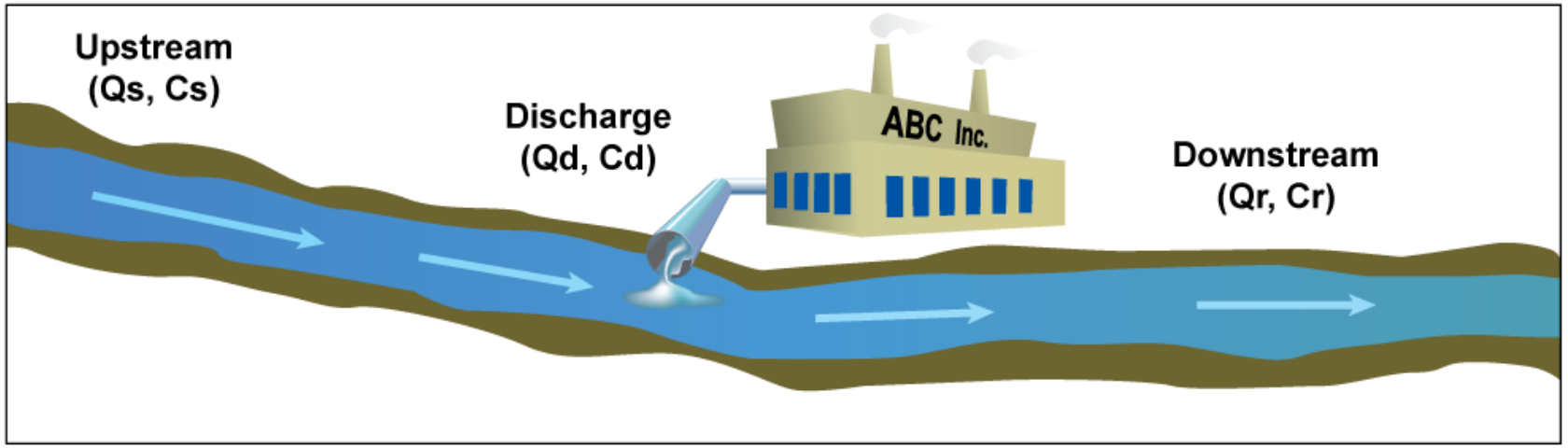
Take Home Message

- The statistical evaluation relies upon data…the more data available, the less uncertainty and the statistical process uses lower multipliers.

Effluent Limitations

- NPDES Permits
- Pollution Standards
- NPDES Applications
- Secondary Treatment
- Water Quality Based Effluent Limitations
  - Critical Conditions
  - Reasonable Potential
  - Effluent limitations
- Final Limitations
- Monitoring and Reporting
- Special Conditions
- Standard Conditions
- Administrative Process

Step 1: Determine Wasteload Allocation(s) – Facility-specific WLA



WLA* = the maximum allowable pollutant concentration in the effluent from ABC Inc. that, after accounting for available dilution under critical conditions, will meet an applicable water quality criterion

*permitting authorities use various terms for what is called a WLA here

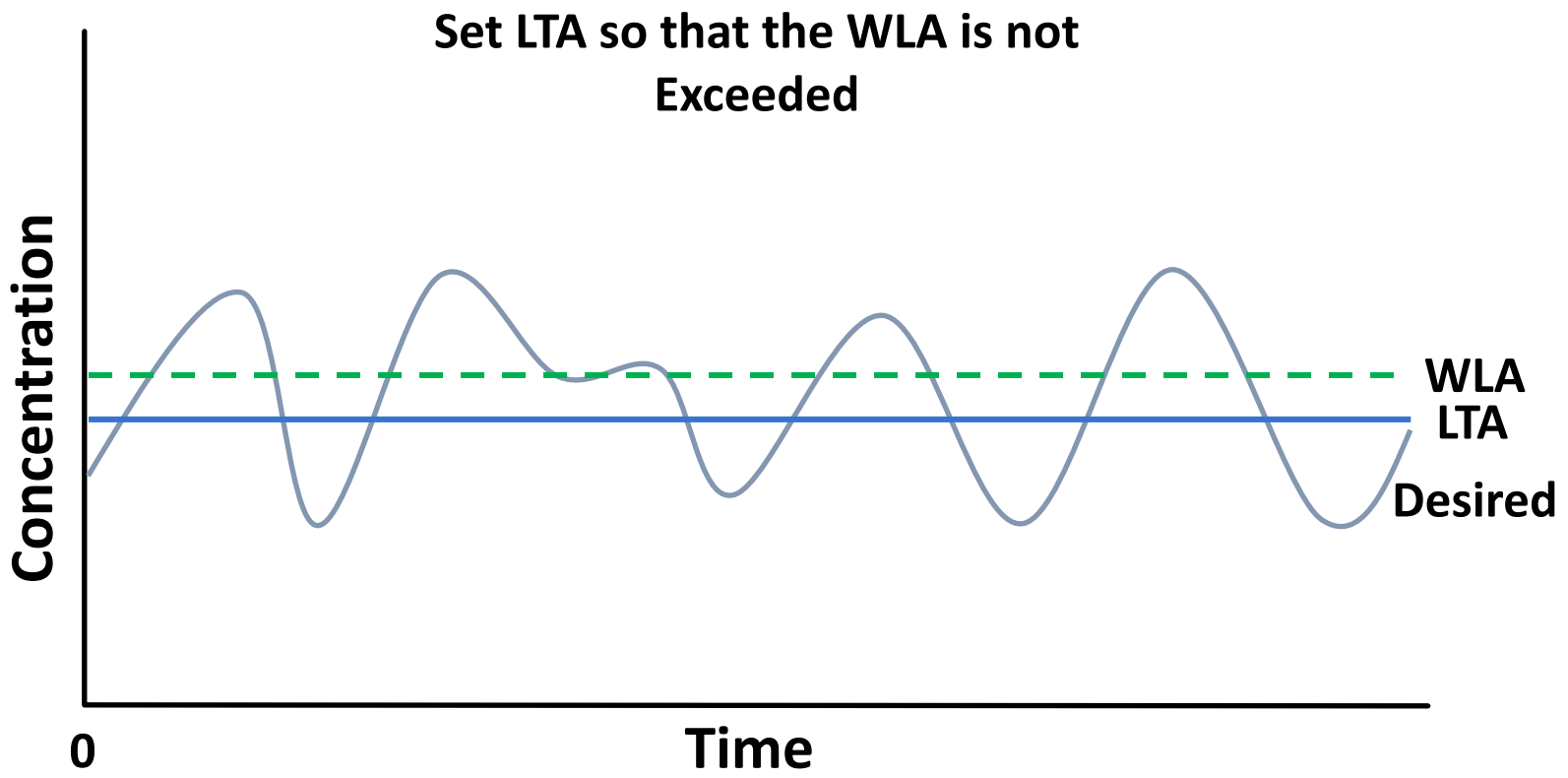
A WLA is Not a WQBEL

WLAs	WQBELs
Derived from water quality criteria through TMDLs, watershed analyses, or facility-specific analyses	Derived from applicable WLAs
Often have the same duration as criteria (e.g., 1-hour average, 4-day average)	Regulations [§ 122.45(d)] require that, for continuous discharges, all effluent limitations shall, ***unless impracticable***, be stated as • MDLs and AMLs for non-POTWs • AWLs and AMLs for POTWs

- WLA is "*never to be exceeded*"
- Characterize "never to be exceeded" by a *probability basis* (e.g., WLA is the 99th percentile concentration on the lognormal effluent distribution)
- Establish an average performance standard by calculating an LTA from the WLA

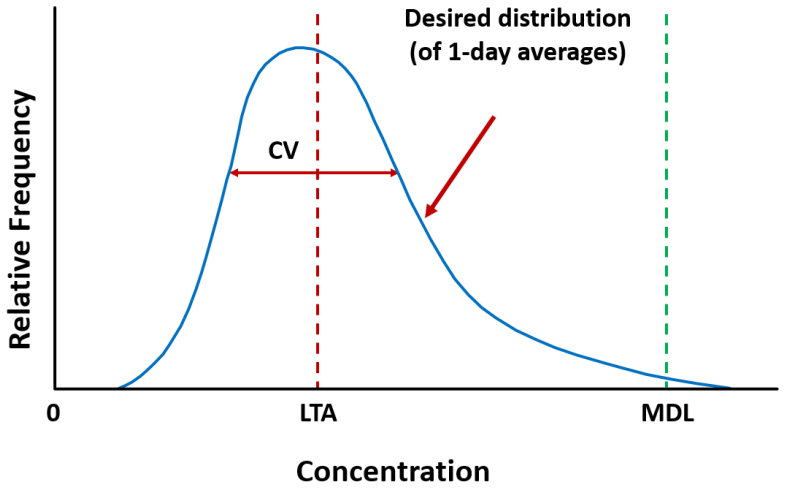
Determining an LTA that's Protective of the WLA

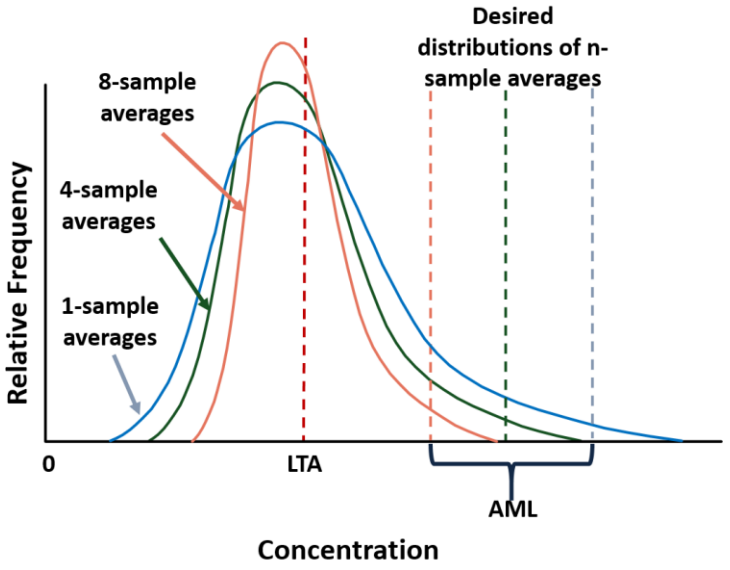
- We calculate LTAs for each WLA for each applicable water quality criterion;
- The lowest LTA will be protective of all the criterion.



Step 4: Calculate MDL and AML

- Use the lognormal distribution to calculate the MDL/AWL and AML from the lowest LTA
- EPAs TSD procedure:
  - uses upper-bound estimates for both MDL/AWL and AML (like effluent guidelines)
    - MDL/AWL set at 99th percentile
    - AML set at 95th percentile
  - considers monthly monitoring frequency when calculating AML





Considerations for Other Parameters

- pH
  - non-conservative
  - instantaneous effects
  - limits often based directly on water quality criteria with no consideration of dilution
  - typically applied as a range that must be met at all times
- Pathogens (e.g., bacteria, viruses)
  - non-conservative
  - human health impacts (beaches)
  - indicator criteria
  - complex duration and frequency considerations
- Nutrients
  - non-conservative
  - limits often derived from interpretation of narrative criterion and state implementation policies
  - relationships between causal and response variables (e.g., far-field effects and delayed impacts)
  - limit expression might include annual or seasonal averages or cumulative loading requirements
- Temperature
  - Often applied as a delta
  - Modeling is typically required

Take Home Message

- The variability of the data determines what the limits are set at…the more data, the better we understand that variability. Even though facilities strive for consistent process control, issues with meeting limits typically do not happen when everything is running perfectly.

Final Limitations

- NPDES Permits
- Pollution Standards
- NPDES Applications
- Secondary Treatment
- Water Quality Based Effluent Limitations
  - Critical Conditions
  - Reasonable Potential
  - Effluent Limitations
- Final Limitations
- Monitoring and Reporting
- Special Conditions
- Standard Conditions
- Administrative Process

Considerations for Final Effluent Limits

- **Step 1:** Select final limits that meet all statutory and regulatory standards.
  - For each pollutant, compare:
    1) TBELs or other existing limitations *with*
    2) WQBELs based on individual facility WLAs for all applicable criteria for the pollutant of concern *and/or*
    3) WQBELs based on a TMDL or other watershed-based requirements
  - Final calculated effluent limitations selected for the permit must ensure that all applicable technology and water quality standards are achieved

Considerations for Final Effluent Limits

- **Step 2:** Compare final limits to limits in previous permit (for reissued permits).
  - The Clean Water Act requires the permitting authority to conduct an anti-backsliding evaluation when a less stringent limit is proposed for a permit renewal.
  - Intended to ensure that a facility that has achieved a certain level of treatment is not allowed to stop treating with out meeting certain criteria.
- **Step 3:** Determine whether final limits allow new or increased pollutant loads.
  - The Clean Water Act requires the permitting authority to conduct an antidegradation review when a new or increased discharge is proposed for a permit.
  - The type of review depends upon the waterbody classification in the water quality standards.
  - Tier 2 Analysis - Is degradation necessary to accommodate important economic or social development in the area where the waters are located?
    - Is the degradation "necessary"? → alternatives analysis
    - Is the degradation "important"? → socio-economic analysis

Take Home Message

- Your final effluent limitation is the most stringent of those calculated to meet either the technology performance standard or a water quality criteria.

Monitoring and Reporting

- NPDES Permits
- Pollution Standards
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Key Regulatory Requirements – Monitoring

- Permits must specify the type, intervals, and frequency of monitoring sufficient to yield data representative of the monitored activity [§ 122.48(b)]
- Permit must include monitoring requirements to assure compliance with permit limitations [§ 122.44(i)(1)]
  - the mass or other measurement specified in the permit for each pollutant limited in the permit
  - the volume of effluent discharged from each outfall
  - other measurements as appropriate (e.g., internal waste streams and determination of compliance with narrative requirements)

Permit Monitoring Requirements

Self-monitoring

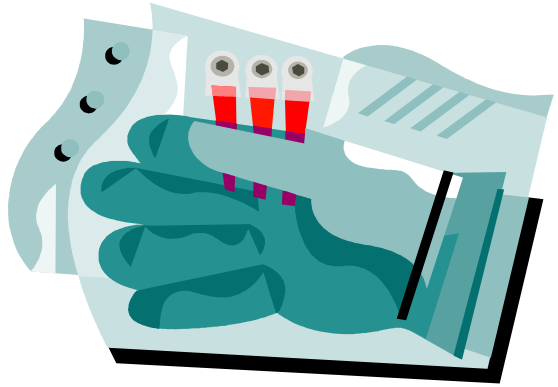
- Primary method of monitoring for NPDES program
- Permittee performs sampling and analysis
- Results determine compliance with permit limits and conditions
- Requirements should be clear and precise

Compliance Monitoring

- Monitoring may be conducted by the permitting authority to confirm self-monitoring data.
- May be conducted due to environmental complaints from the public.

Specifying Monitoring in a Permit

- Federal requirements
  - must be sufficient to yield data representative of the monitored activity [§ 122.48(b)]
  - waivers available for certain effluent guideline-based pollutants [§ 122.44(a)(2)]
- Frequency
  - Permitting authority requirements
  - Consider frequency of discharge, size and design of facility, nature of pollutants, cost, etc.
- Sample Type
  - Grab
  - Composite
  - Continuous
- Location
  - Representative of the discharge
  - Accessible location



Required Analytical Methods

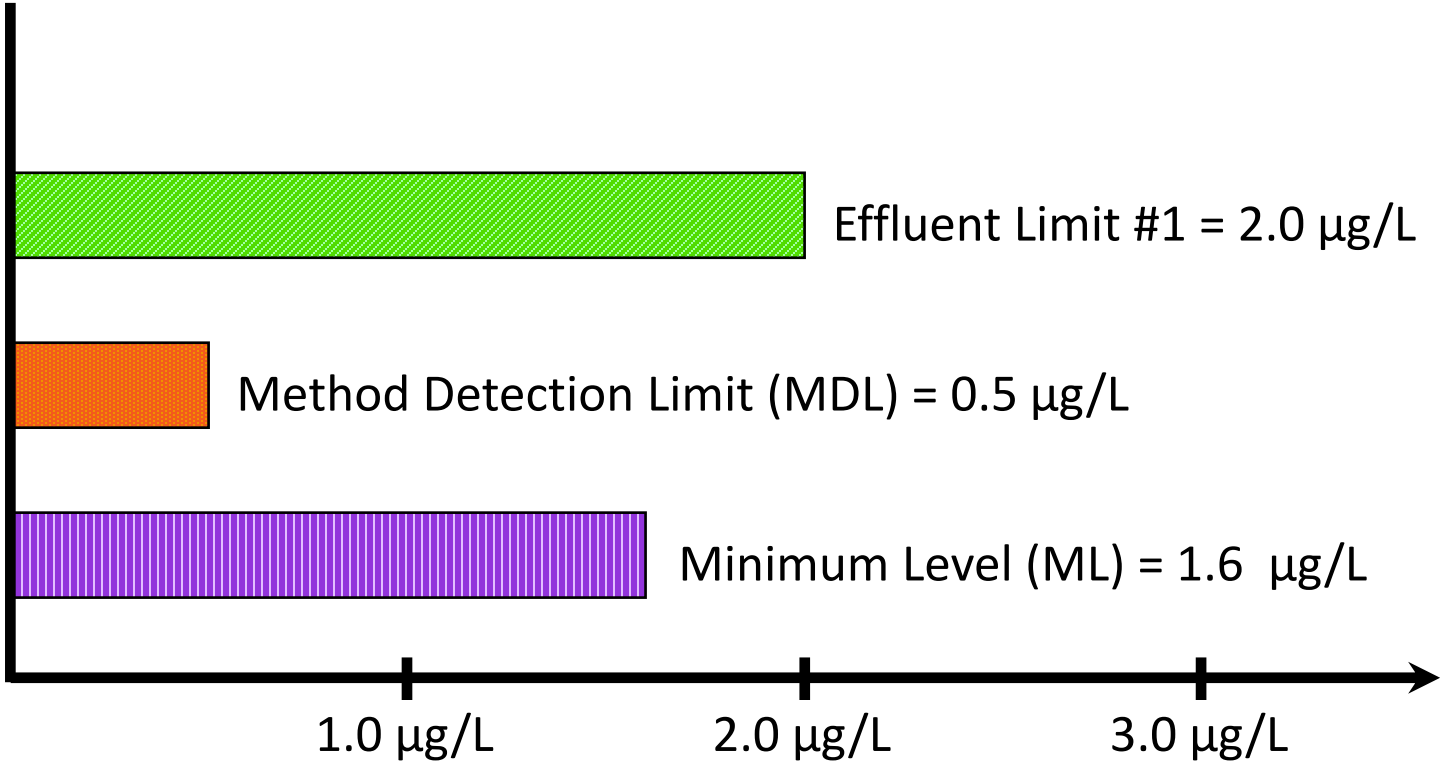
- 40 CFR Part 136
- Alternative methods can be approved
- National Environmental Methods Index (NEMI) at **http://www.nemi.gov**
- Regulations at §122.44(i) and Part 136 require the permitting authority to establish in the permit a sufficiently sensitive method (SSM)
- A method is sufficiently sensitive if
  - the method ML is at or below the limit established in the permit or
  - the method has the lowest ML of the approved analytical methods
- Many states ensure use of SSM by establishing required MLs for specific parameters

Specifying Analytical Requirements

- ***Method Detection Limit* (MDL):** the minimum concentration of analyte that can be measured and reported with 99% confidence that the analyte concentration is distinguishable from the method blank results [§ 136.2(f)]
  - ***Method Detection Limit* (MDL):** A concentration at which the pollutant can be reliably detected
- ***Minimum Level* (ML):** concentration at which the entire analytical system gives a recognizable signal and acceptable calibration point
  - ***Minimum Level* (ML):** A concentration at which the pollutant can be accurately quantified

Specifying Analytical Methods

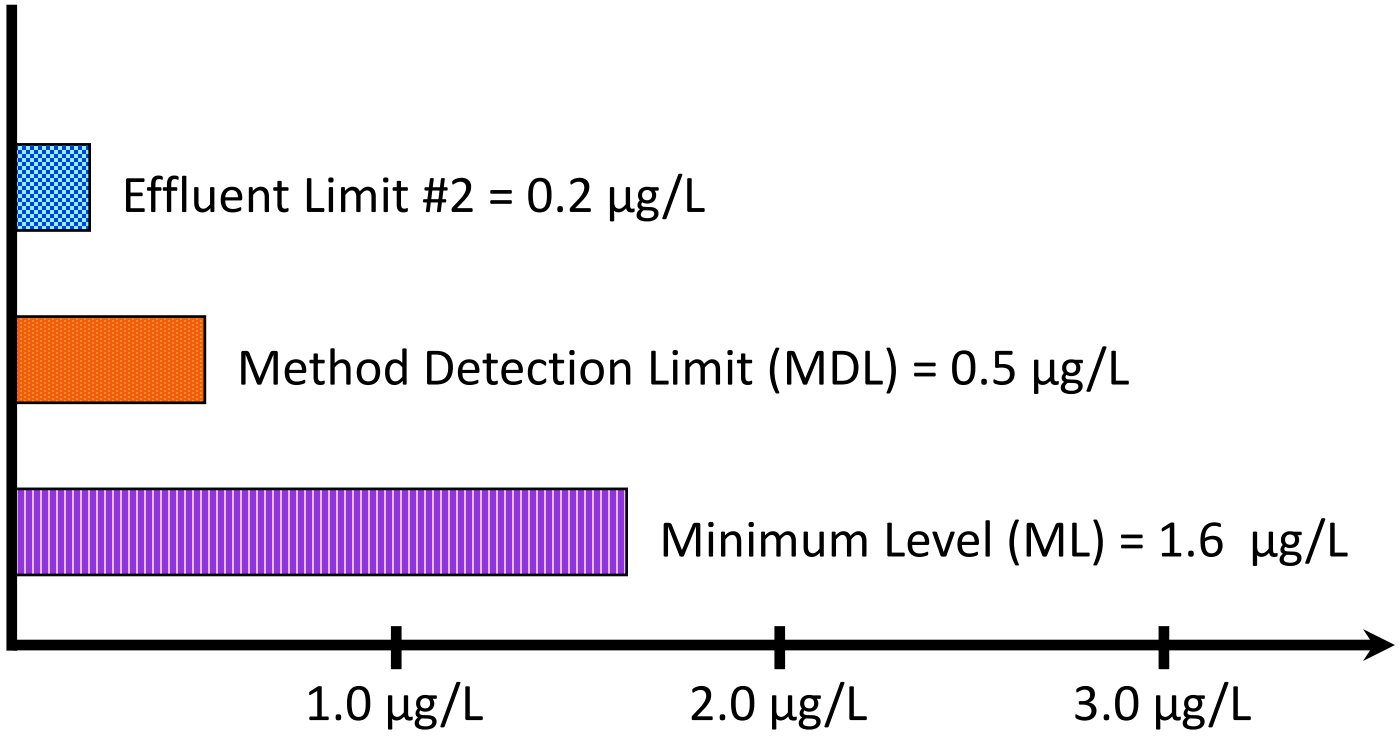
Example #1: Effluent limit is greater than both the MDL and ML



Determine compliance using results from Part 136 method

Specifying Analytical Methods

Example #2: Effluent limit is below both the MDL and ML



Determine compliance using results from ??

Key Regulatory Requirements – Reporting

- Permit establishes what must be reported
  - monitoring results as required in permit [§ 122.41(l)(4)]
  - data for pollutants monitored more frequently than required using approved methods [§ 122.41(l)(4)(ii)]
- Permit establishes when information will be reported
  - reporting requirements must be established on a case-by-case basis with the frequency dependent on the nature and effect of the discharge, but in no case less than once a year [§ 122.44(i)(2)]
- 40 CFR 122.41() specifies the retention times for records
  - wastewater records for 3 years
  - Biosolids records for 5 years
  - States may specify a longer retention time.

Key Regulatory Requirements – Reporting (continued)

- Who must sign monitoring reports?
  - the permittee [§ 122.22(b)]
- What format is used for reporting?
  - Discharge Monitoring Reports (DMR) [§ 122.41(l)(4)(i)]
    - authorized programs may substitute agency name, address, and logo in place of EPA's
    - permitting authority may require additional reporting
  - Electronic Reporting Rule (40 CFR 127)
    - **Phase 1:** permittees must submit DMRs electronically starting **12/21/16** (e.g., via state eDMR or EPA NetDMR)
    - **Phase 2:** general permit, CSO, pretreatment and other NPDES program reports must be electronically submitted starting **12/21/2025**
    - authorized programs electronically submit information to EPA and data are available to the public through EPA's website (ECHO)

Take Home Message

- Monitoring is required to determine compliance with permit conditions so we have to ensure we are using sufficiently sensitive methods.

- Monitoring also plays an important role in discovering trends that identify issues that may become permit violations and address them proactively.

Special Conditions

- NPDES Permits
- Pollution Standards
- NPDES Applications
- Secondary Treatment
- Water Quality Based Effluent Limitations
  - Critical Conditions
  - Reasonable Potential
  - Effluent Limitations
- Final Limitations
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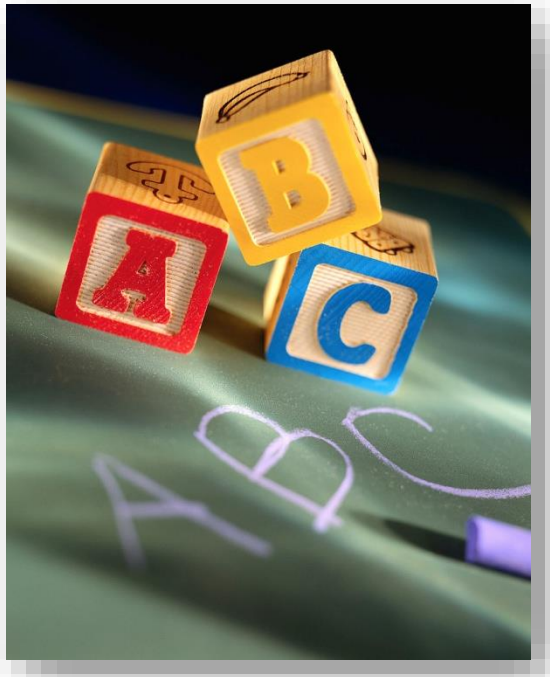
- Standard Conditions
- Administrative Process

Categories of Special Conditions

All Facility Types

- **A**dditional monitoring and special studies
- **B**est management practices (BMPs)
- **C**ompliance schedules



POTW Special Conditions

- Pretreatment
- CSOs
- Biosolids

Special Studies Example – WET and TIE/TRE

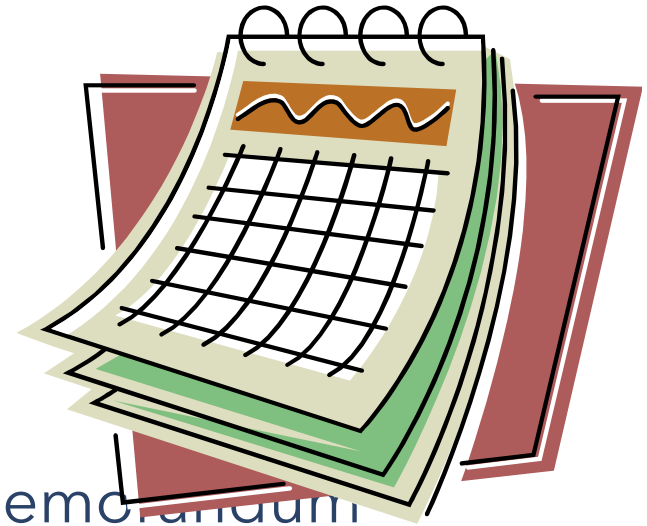
- A special condition could require initiation of a TIE/TRE when the results of WET tests exceed
  - WET limitations
  - WET "trigger values"
- When Wet Limits are not included, there may be a requirement to conduct WET testing that has trigger conditions if toxicity is found.
- A TIE/TRE is a site-specific special study designed to:
  - identify the causative agents of whole effluent toxicity (WET)
  - isolate the sources of the toxicity
  - evaluate the effectiveness of toxicity control options
  - confirm the reduction in effluent toxicity after control measures are in place

Best Management Practices

- Types of specific BMPs
  - secondary containment, good housekeeping, employee education
  - posting at discharge locations, online notifications of incidents
  - flow detection at discharge points for wet weather discharge notification, monitoring downstream dissolved oxygen fluctuation
- BMPs should
  - be qualitative
  - indicate **how** or **what**, not how much
- BMPs should not
  - substitute for quantitative controls
  - tell managers how to run their plants
  - require costly construction or methods where simple management practices would suffice

Compliance Schedules – § 122.47

- Permit may, when appropriate, specify a schedule of compliance leading to compliance with CWA and regulations
- Technology-based limitations
  - generally not allowed because CWA compliance deadlines have passed for existing sources
- Water quality-based limitations
  - 40 CFR 131.15 *(effective 10/20/2015)*
  - Office of Wastewater Management (OWM) Memorandum
- Compliance schedule vs. Schedules in enforcement actions



Special Conditions for POTWs

National Pretreatment Program

- Major goal is controlling discharges in order to:
  - prevent interference with POTW processes
  - prevent pass through of pollutants
  - protect sludge management options
- Additional programmatic goals
  - encourage recycling and reclamation
  - ensure POTW personnel health and safety
- Who is required to have a pretreatment program?
  - POTWs > 5 MGD with dischargers subject to standards
  - POTWs ≤ 5 MGD with past problems
  - unless state assumes total responsibility for program implementation [§ 403.10(e)]

NPDES Permits Drive the Pretreatment Program by Requiring:

- Adequate legal authority
- Maintenance of industrial user inventory
- Development and implementation of local limits
- Individual control mechanisms be issued to all Significant Industrial Users (SIUs)
- Compliance monitoring activities
- Swift and effective enforcement
- Data management and recordkeeping
- Reporting to the approval authority (EPA or state/territory/tribe)
- Resources
- Public participation

Requirements for Combined Sewer Overflows (CSOs)

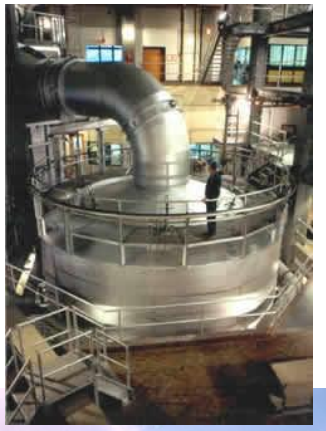
- EPA's CSO control policy is a national framework for controlling CSOs through the NPDES permitting program.
- The CSO Long-term Control Plan (LTCP) implements these requirements.
  - Nine Minimum Controls (Technology)
  - Presumption and Demonstration Approaches (Water Quality)

Long-Term Control Plan - CSOs

- Developed by municipalities
- Nine Elements of the LTCP
  - Characterization, monitoring, and modeling
  - Public participation
  - Consideration of sensitive areas
  - Evaluation of alternatives
  - Cost/performance considerations
  - Operational plan
  - Maximization of treatment at POTW
  - Implementation schedule
  - Post construction compliance monitoring program

Permits for Municipal Sewage Sludge (Biosolids)

- Any CWA section 402 permit issued to a POTW should contain requirements for sewage sludge use and/or disposal
- 40 CFR Part 503 requirements should be incorporated into a permit for:
  - incineration
  - land application
  - surface disposal
- Other entities may be delegated responsibility to comply (40 CFR Part 503 standards and requirements might not all be placed in the POTW permit)
- Permits must contain:
  - additional standard conditions
  - special conditions



Take Home Message

- Special Conditions are the “catch all” section of the permit and it is important to review this section so you understand what is being required in addition to the effluent limitations to ensure you stay in compliance with the permit conditions.

Standard Conditions

- NPDES Permits
- Pollution Standards
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- Standard Conditions
- Administrative Process

Standard Conditions Requirements

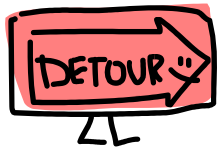
- Standard conditions Regulations
  - § 122.41–Conditions applicable to all permits
  - § 122.42–Additional conditions applicable to specified categories of NPDES permits
- Standard conditions must appear in every NPDES permit either
  - expressly (verbatim) or
  - by reference
- States, tribes, or territories might have more stringent requirements

List of Standard Conditions – § 122.41

a. Duty to comply
b. Duty to reapply
c. Need to halt or reduce activity not a defense
d. Duty to mitigate
e. Proper O & M
f. Permit actions
g. Property rights
h. Duty to provide information
i. Inspection and entry
j. Monitoring and records
k. Signatory requirements
l. Reporting requirements
    1. Planned changes
    2. Anticipated noncompliance
    3. Transfers
    4. Monitoring reports
    5. Compliance schedules
    6. 24-hour reporting
    7. Other noncompliance
    8. Other information
    9. Identification of initial recipient
m. Bypass
n. Upset

Bypass [§ 122.41(m)]

- Intentional diversion of waste streams from any portion of a treatment facility



- Bypass not exceeding limitations allowed without notification only where for essential maintenance to assure efficient operation [§ 122.41(m)(2)]
- Bypass prohibited otherwise except where [§ 122.41(m)(4)]
  - a bypass was unavoidable to prevent loss of life, personal injury or severe property damage **and**
  - there were no feasible alternatives to the bypass **and**
  - facility gives notice before bypass or within 24 hours if bypass is unexpected

Upset [§ 122.41(n)]

- An exceptional incident that causes an unintentional, temporary non-compliance with a technology-based effluent limitation
- A demonstrated upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based limitations
- Conditions necessary to demonstrate upset:
  - identify cause of upset
  - show that facility was operated properly at the time
  - proper notice to permitting authority (24-hour reporting)
  - compliance with remedial measures under § 122.41(d)

Additional Standard Conditions – § 122.42

- Notification for POTWs [§ 122.42(b)]
  - introduction of new pollutants from indirect discharger that would be subject CWA technology requirements if discharging directly
  - change in pollutant volume or character of pollutants introduced

Take Home Message

- Reporting Requirements are often a source of noncompliance issues for a facility. It is a good idea to make a checklist for required actions if an event triggers reporting.

Administrative Process

- NPDES Permits
- Pollution Standards
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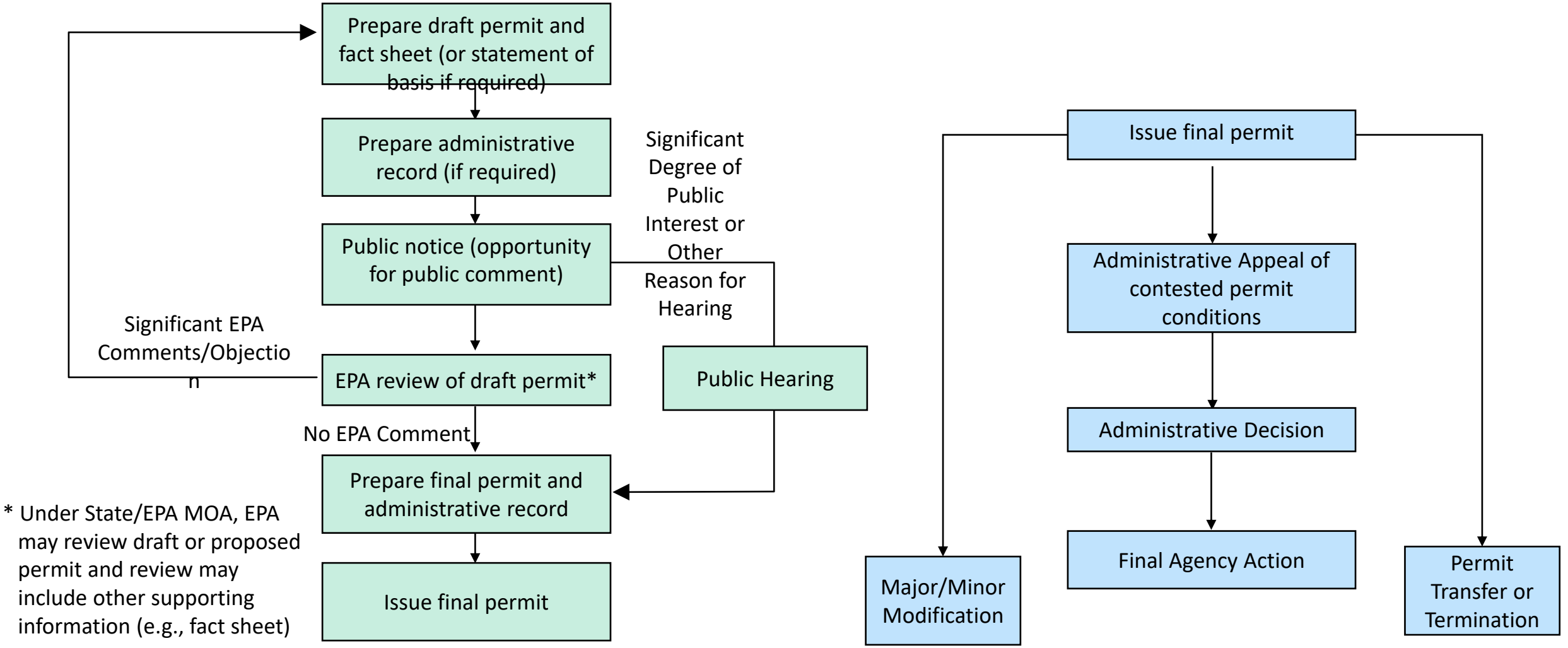
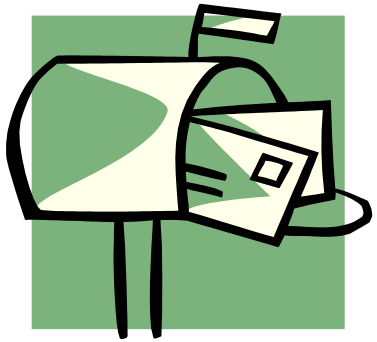
NPDES Permitting Process – State-Issued Permit



Public Notice and Public Comments

- Types of actions requiring public notice [§ 124.10(a)]
  - draft NPDES permit
  - public hearing scheduled
  - appeal granted (EPA-issued permits)
  - major permit modifications (after issuance)
- Methods for public notice [§ 124.10(c)]
  - direct mailing
  - publication in newspaper
  - NPDES Updates Rule (effective June 12, 2019) allows web publication in lieu of newspaper
- Timing of public notice [§ 124.10(b)]
  - must allow at least 30 days for public comments
- Responding to comments [§ 124.11, 124.17]
  - significant comments require a response in writing
  - explain changes from the draft permit
  - response to comments must be made available to public
- Public Hearings [124.11,124.12]
  - May be requested by anyone, Agency has discretion to hold a hearing or not.



After Final Permit Issuance

- Permit appeals (§ 124.19)
- Permit modifications
  - "major" modifications (§ 122.62)
    - Used to address changes or information that might impact permit conditions
    - Administrative procedures must be followed (i.e., draft permit, public notice, EPA notification)
  - minor modifications (§ 122.63)
    - Used to make corrections to permit conditions with consent of the permittee
    - Exempt from administrative procedures (draft permit, public notice, etc.)
- Permit termination (§§ 124.5, 122.64)
- Permit transfer (§ 122.61)

Take Home Message

Waiting for the Public Notice and Request for Comments to have a discussion with your permit writer makes resolving concerns over effluent limitations and permit conditions more formal and usually more complex.

Where We Have Been

- NPDES Permits
- Pollution Standards
- NPDES Applications
- Secondary Treatment
- Water Quality Based Effluent Limitations
  - Critical Conditions
  - Reasonable Potential
  - Effluent Limitations
- Final Limitations
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Questions?

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