Overview of the National Pollutant Discharge Elimination System (NPDES) Program

Key NPDES Provisions in the FWPCA Amendments of 1972

- Established NPDES, pretreatment, and construction grants programs [section 402]
- Established maximum permit term of 5 years
- Established both technology-based and water quality-based requirements
- Established compliance deadlines
- Provided for authorization of state NPDES permitting programs
- Indicated that permit compliance is a shield
- Established significant penalties for permit violations

NPDES Statutory Framework

- All *point sources*
- Discharging *pollutants*
- Into *waters of the U.S.*

Must obtain an NPDES *permit* from EPA or an authorized state, territory, or tribe

What is a Permit?

- A permit is a license . . .
  - issued by the government
  - granting permission to do something that would be illegal in the absence of the permit (e.g., driver's license)
- There is no right to a permit and it is revocable for cause (e.g., reckless driving)
- Essentially, an *NPDES permit* is a *license to discharge* and can be *revoked for cause*

Point Source – 40 CFR 122.2

- Any discernible, confined, and discrete conveyance, including but not limited to:
  - any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged
  - *does not include return flows from irrigated agriculture or agricultural storm water runoff*

Pollutant – 40 CFR 122.2

- Dredged spoil, solid waste, incinerator residue, filter backwash, 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
  - *does not include sewage from vessels or injected wastes*

Waters of the United States

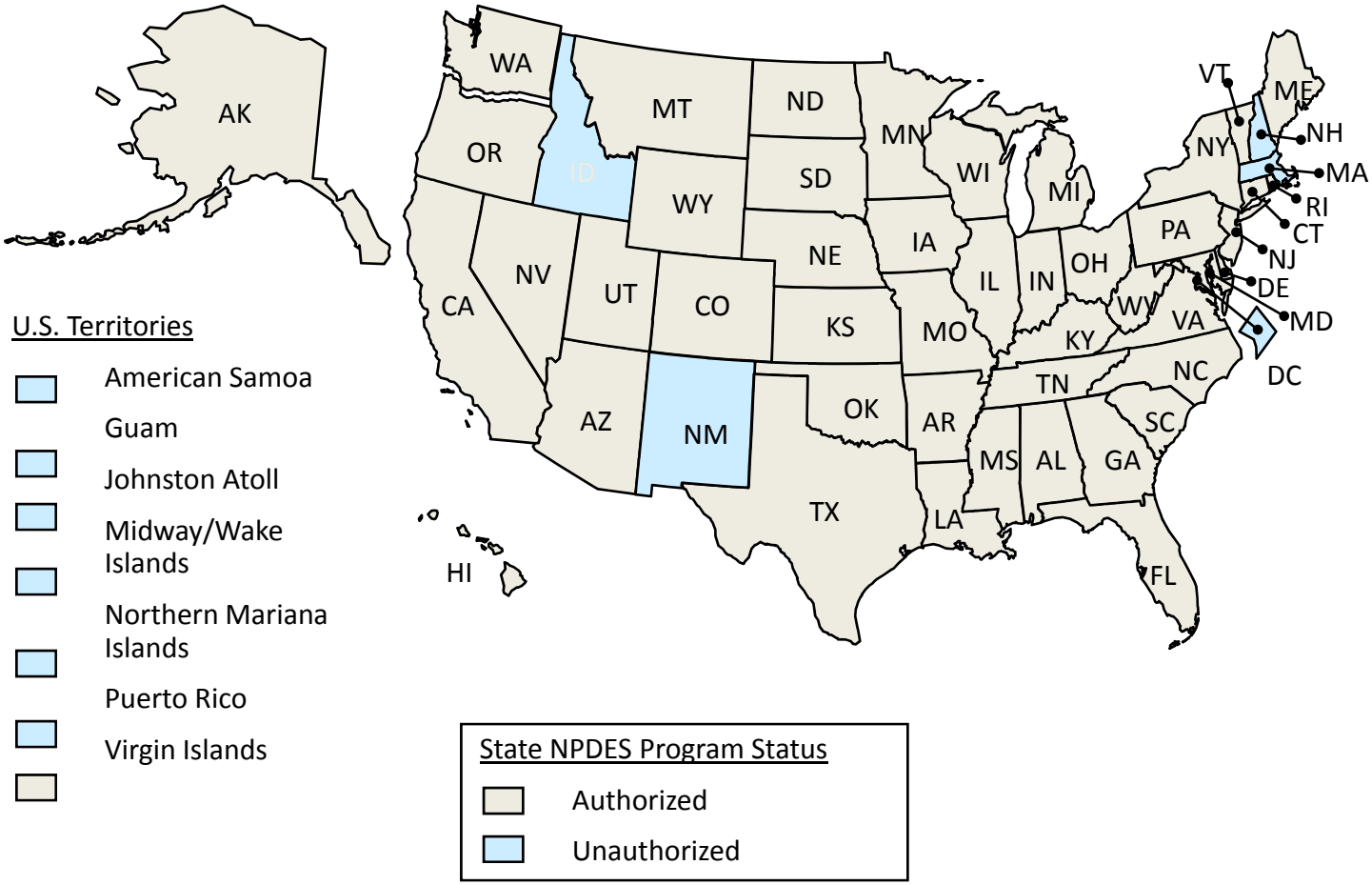
- Regulatory definition identifies other types of surface waters including:
  - rivers and streams
  - lakes and ponds
  - wetlands
  - sloughs
  - prairie potholes
  - intermittent streams
  - territorial seas
  - etc.

- Supreme Court rulings have affected decisions regarding “waters of the US”

Federal Government and State/Territory/Tribe Roles

- Before state/territorial/tribal program authorization:
  - EPA issues permits
  - EPA conducts compliance and monitoring activities
  - EPA enforces
- After state/territorial/tribal program authorization:
  - state/territory/tribe implements as above
  - EPA oversees
    - administrative, technical, and legal support and training
    - enforcement as necessary
    - grants

NPDES Program Authorizations (as of November 2010)



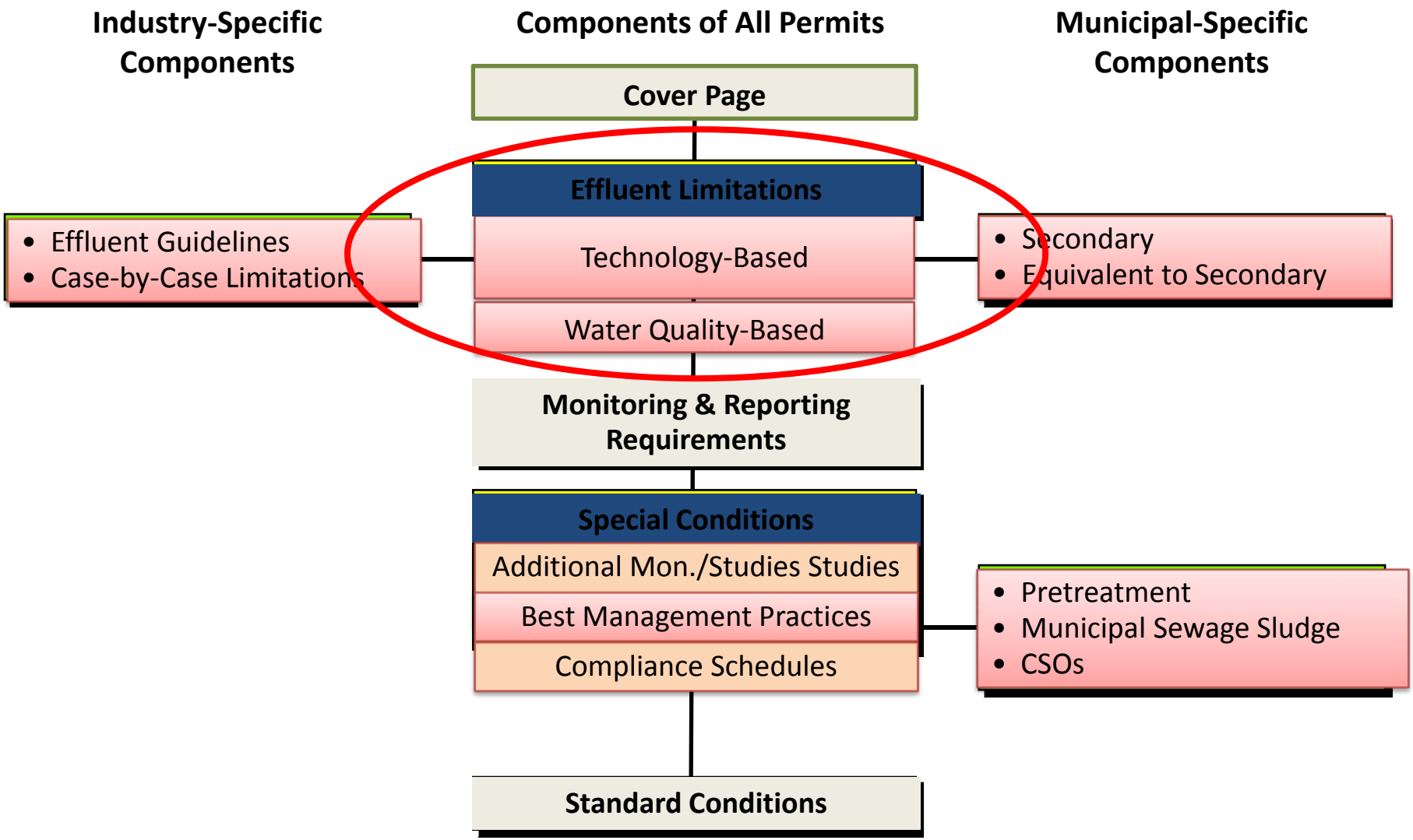
Types of NPDES Permits – Individual

- Individual Permit
  - 1 application submitted → 1 permit issued
  - appropriate where facility-specific permit conditions (e.g., effluent limitations, management practices, monitoring and reporting) are needed

Types of NPDES Permits - General

- General Permit (40 CFR 122.28)
  - 1 permit issued many permittees covered
  - Appropriate where
    - multiple, similar sources (e.g., same category or similar process) within the same geographic area require permit coverage
    - sources have similar discharges and would require the same or similar permit conditions
  - Permit must identify:
    - area of coverage
    - sources covered
    - application process (Notice of Intent)

Permit Components



Technology- and Water Quality-based Effluent Limitations

Goal or Policy:	▪ Zero Discharge of Pollutants	▪ Fishable and Swimmable Waters ▪ No Toxics in Toxic Amounts
Standards:	▪ Technology	▪ Water Quality
NPDES Regulations:	▪ 40 CFR 122.44(a), (e) ▪ 40 CFR 125.3	▪ 40 CFR 122.44(d)

Develop TBELs (derived from technology standards) for all applicable pollutants of concern. Develop WQBELs where TBELs are not adequate to meet water quality standards in the receiving water.

Technology-based Effluent Limitations

- **Technology-based requirements:**
  - **establish performance-based level of pollutant controls**
    - **conventional pollutants**
    - **nonconventional pollutants**
    - **toxic (priority) pollutants**
  - **provide equity among dischargers within categories**

Technology-based Effluent Limitations

- **National technology-based standards**
  - **secondary treatment standards for POTWs**
  - **effluent guidelines for certain categories of non-POTWs (industrial discharges)**
- **In the absence of national standards**
  - **technology-based requirements developed on a case-by-case basis**
- **Technology-based requirements implemented in NPDES permits through technology-based effluent limitations (TBELs)**

Water Quality-based Effluent Limitations

- Water quality standards apply throughout the waterbody (or segment of a waterbody) as defined by the state, territory, or tribe
- Effluent limitations apply at the compliance point established in the permit (generally "end of pipe")
- Section 301(b)(1)(C) requires compliance with effluent limitations necessary to meet water quality standards

Relationship Between WQS and Effluent Limitations

Water Quality Criteria

- Magnitude
- Duration
- Frequency

Effluent Limitations

- **Magnitude**
- **Averaging Period**

Permit writers calculate end-of-pipe water quality-based effluent limitations where necessary to ensure that water quality standards are attained in the receiving water.

Establishing Water Quality-based Effluent Limitations

Identify Applicable Water Quality Standards

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Characterize the Effluent and Receiving Water

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Determine the Need for Parameter-specific WQBELs

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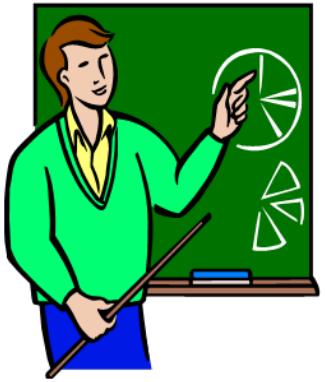
Calculate Parameter-specific WQBELs

Identify Applicable WQS



Permit writer's task:

- Identify the specific receiving water segment
- Determine all numeric and narrative water quality criteria applicable to the receiving water segment
- Follow any implementation policies associated with applicable standards and criteria

Establishing Water Quality-based Effluent Limitations

Identify Applicable Water Quality Standards

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Characterize the Effluent and Receiving Water

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Determine the Need for Parameter-specific WQBELs

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Calculate Parameter-specific WQBELs

Characterize the Effluent and Receiving Water

Step 1: Identify Pollutants of Concern

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Step 2: Determine Whether Consideration of Dilution or Mixing is Allowed by WQS

↓

Step 3: Identify Critical Conditions for Effluent and Receiving Water Modeling

↓

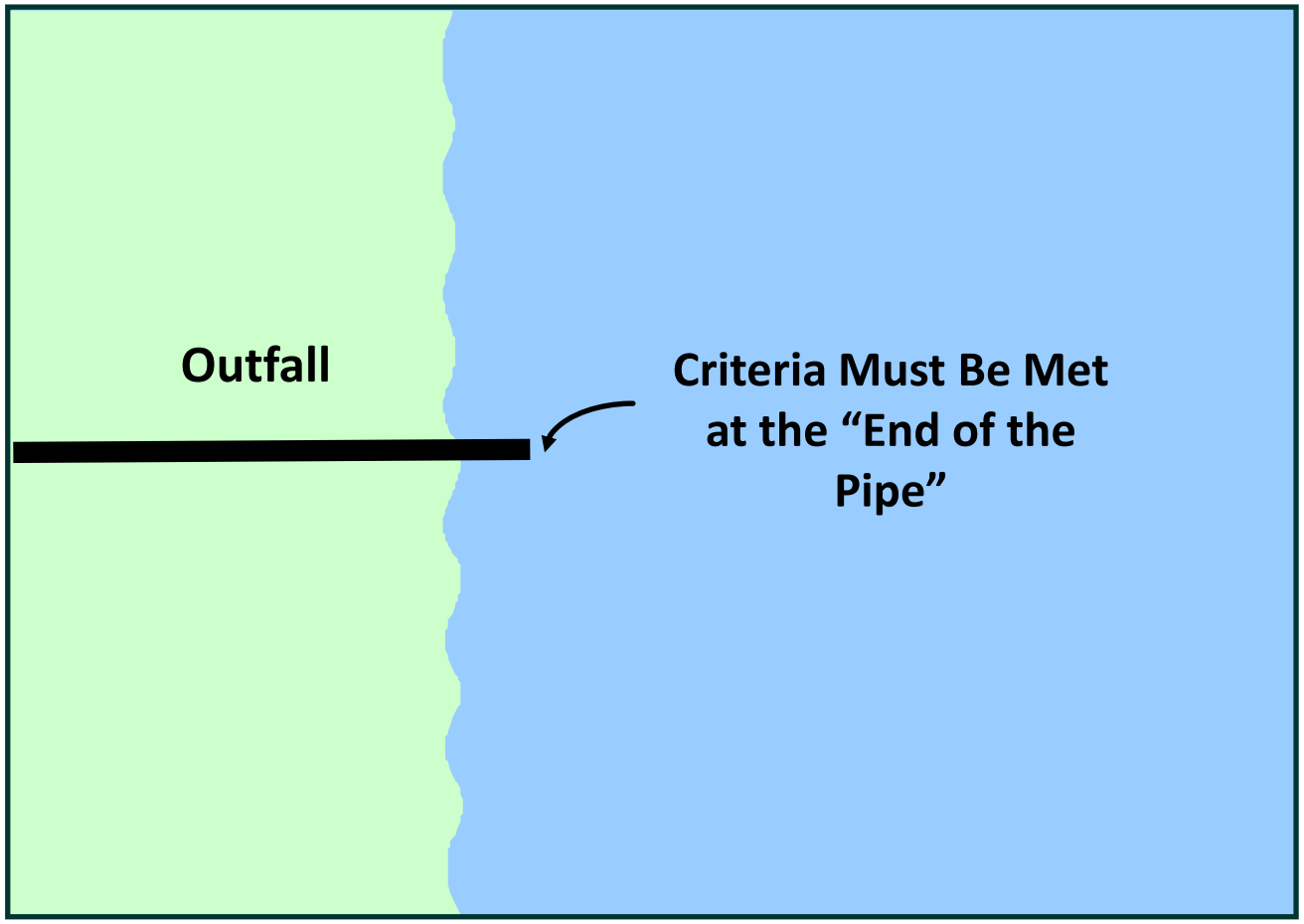
Step 4: Establish Appropriate Dilution Allowance or Mixing Zone for Each Pollutant of Concern

Step 1: Identify Pollutants of Concern

- Pollutants of concern are pollutants:
  - With an applicable TBEL
  - With a WLA from a TMDL or watershed analysis
  - Identified as needing WQBELs in the previous permit
  - Identified as present in the effluent through monitoring or other available data

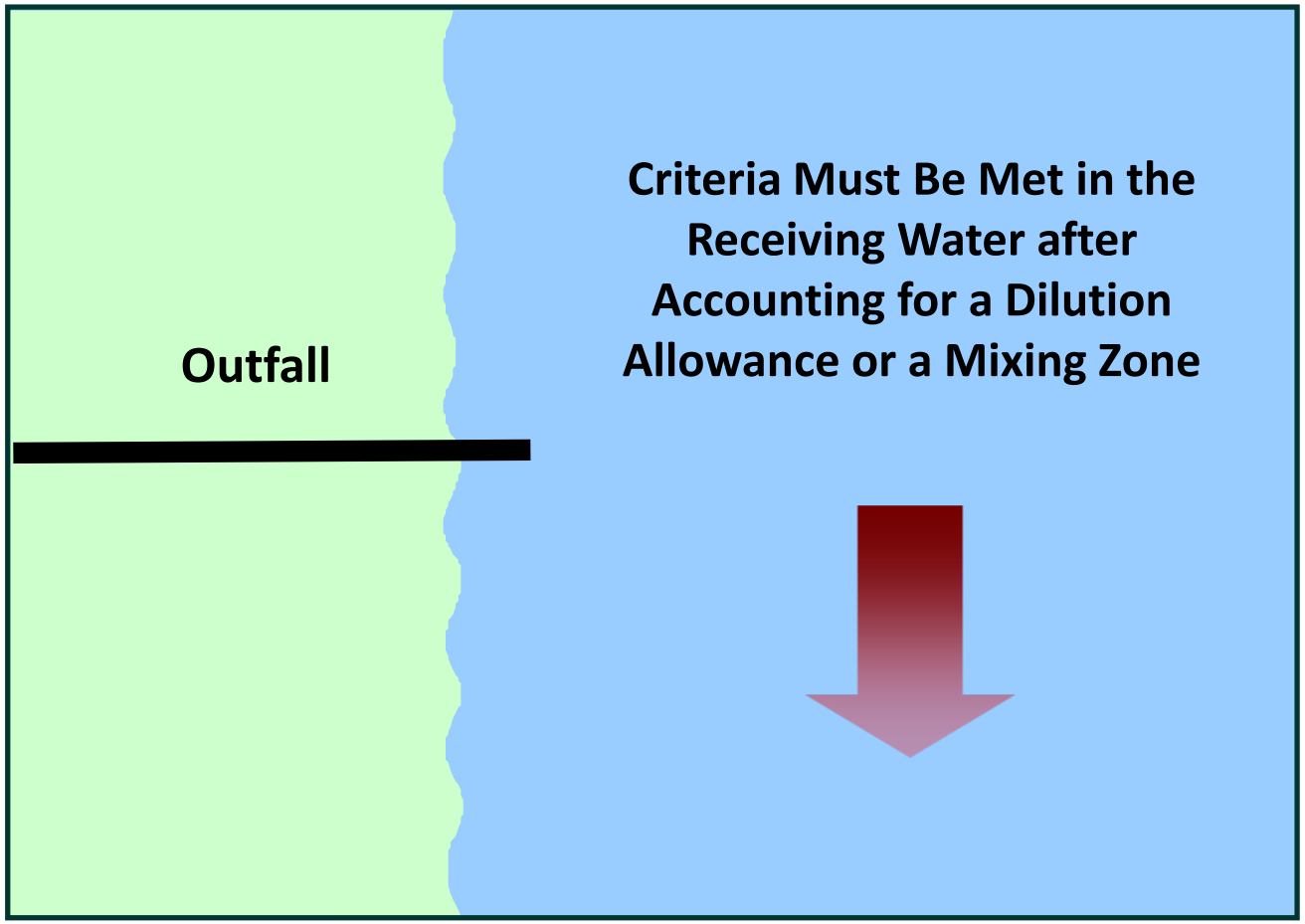
Step 2: Determine Whether Consideration of Dilution or Mixing is Allowed by WQS

If water quality standards *do not allow* consideration of dilution or mixing zones, water quality criteria must be attained at the *point of discharge*.



Step 2: Determine Whether Consideration of Dilution or Mixing is Allowed by WQS

If standards *allow* consideration of dilution or mixing zones, water quality criteria must be met in the receiving water after accounting for allowable dilution or at the edge of the regulatory mixing zone.



Step 3: Identify Critical Conditions for Effluent and Receiving Water Modeling

- Most of the time, permit writers use *steady-state modeling* to model the effluent and receiving water
- Steady-state modeling
  - Predicts the impact of the effluent on the receiving water for a *single set of conditions*
  - Assumes *critical conditions* for flow, pollutant concentrations, and environmental effects

Step 3: Identify Critical Conditions for Effluent and Receiving Water Modeling

- Receiving water critical conditions:
  - Receiving water flow (if applicable)
  - Background pollutant concentrations (pollutants of concern)
  - Other receiving water characteristics (e.g., temperature, pH, reaction rates)
- Effluent critical conditions:
  - Effluent flow
  - Effluent pollutant concentrations (pollutants of concern)

Step 4: Establish Appropriate Dilution Allowance or Mixing Zone

Under critical conditions, what type of mixing occurs?

- rapid and complete mixing
- incomplete mixing

Step 4: Establish Appropriate Dilution Allowance or Mixing Zone

What is the allowable dilution when there is rapid and complete mixing in a river or stream?

- Water quality standards could allow as much as *100 percent of the critical low flow* as a dilution allowance when there is rapid and complete mixing
- Some water quality standards might allow only *a portion of the critical low flow* even where there is rapid and complete mixing

Step 4: Establish Appropriate Dilution Allowance or Mixing Zone

What is the allowable dilution when there is incomplete mixing?

- Water quality standards might allow a permit writer to consider a *limited dilution allowance* or a *regulatory mixing zone* under critical conditions where there is incomplete mixing

Establishing Water Quality-based Effluent Limitations

Identify Applicable Water Quality Standards

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Characterize the Effluent and Receiving Water

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Determine the Need for Parameter-specific WQBELs

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Calculate Parameter-specific WQBELs

Determine the Need for Parameter-specific WQBELs

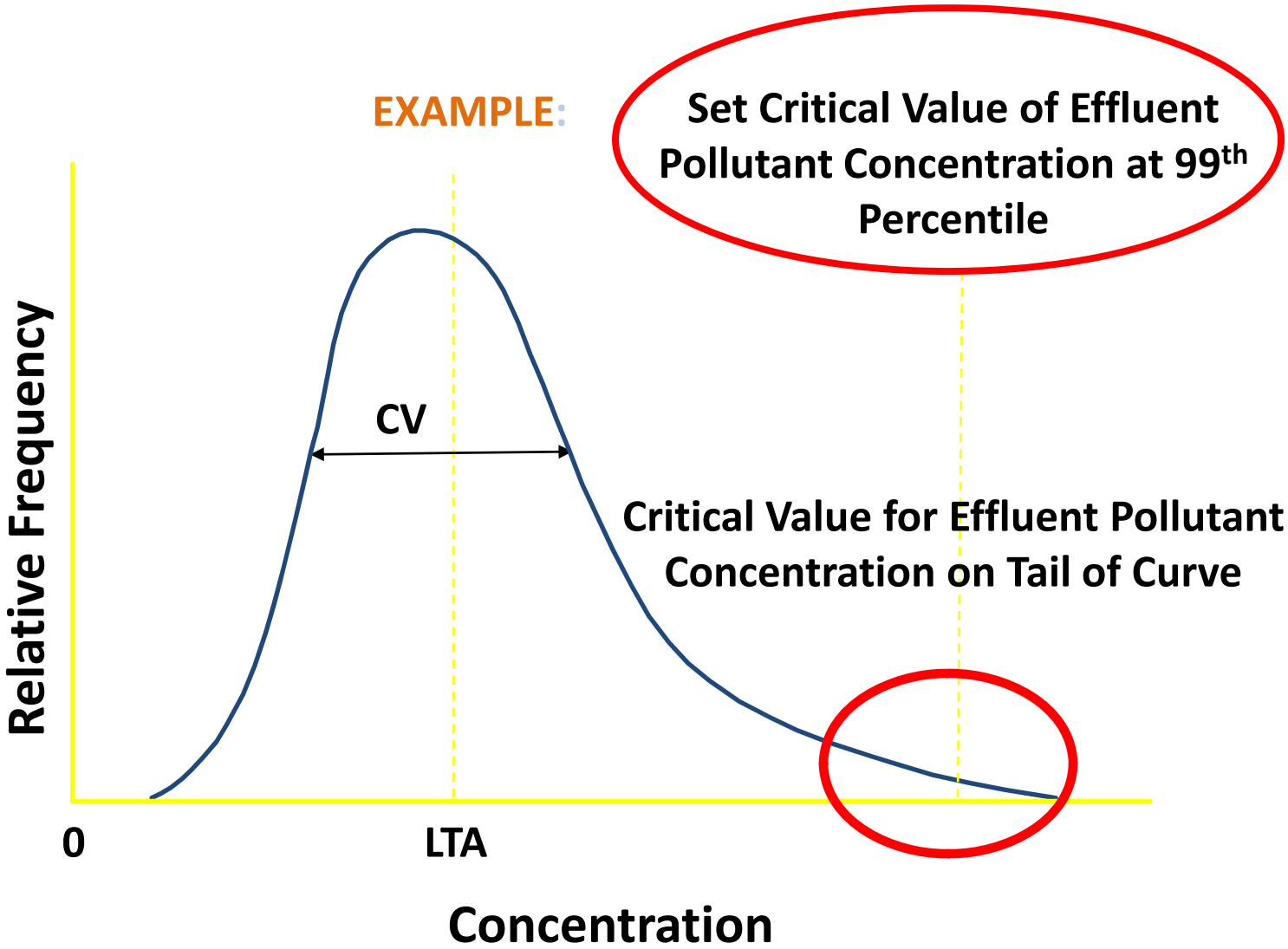
When must a permit writer establish effluent limitations using water quality criteria?

Answer: Limitations must be established in permits to control all pollutants or pollutant parameters that are or may be discharged at a level that will *cause*, have the *reasonable potential to cause*, or *contribute* to an excursion above any state water quality standard [40 CFR 122.44(d)(1)(i)].

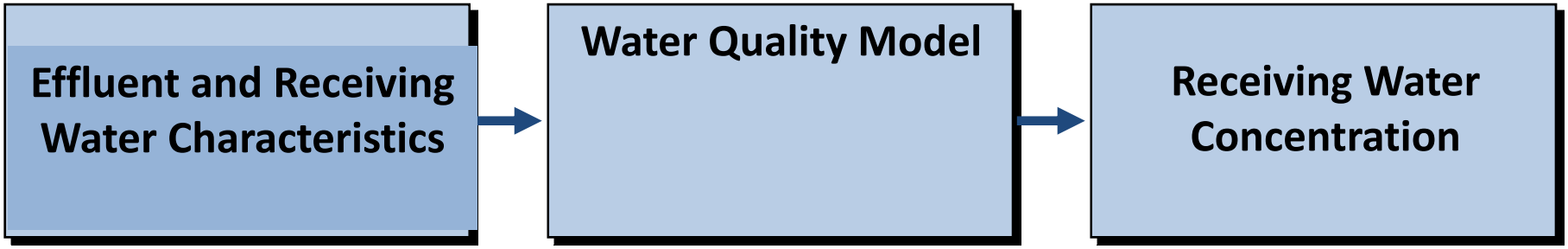
Critical Conditions

- Receiving water critical conditions:
  - Receiving water flow (if applicable)
  - Background pollutant concentrations (pollutants of concern)
  - Other receiving water characteristics (e.g., temperature, pH, reaction rates)
- Effluent critical conditions:
  - Effluent flow
  - Effluent pollutant concentrations (pollutants of concern)

Determining a Critical Value of the Effluent Concentration



Is There Reasonable Potential?



For steady-state modeling under critical conditions:

- **If the receiving water concentration *exceeds* the applicable water quality criterion, then there is *reasonable potential* and the permit writer <u>must</u> establish WQBELs**

- **If the receiving water concentration is *equal to or less than* the applicable water quality criterion, then there is *no reasonable potential* and we <u>have not demonstrated a need</u> to establish WQBELs**

Establishing Water Quality-based Effluent Limitations

Identify Applicable Water Quality Standards

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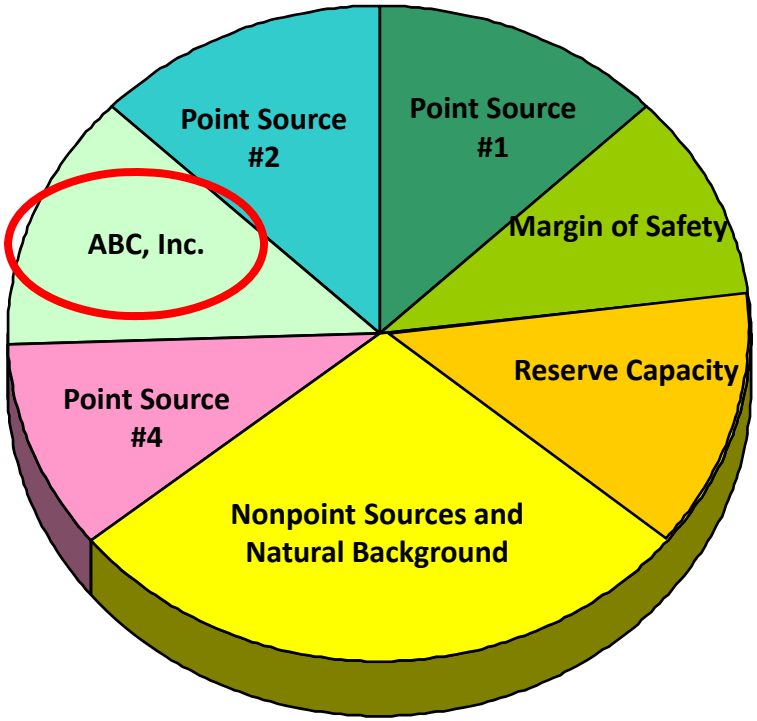
Calculate Parameter-specific WQBELs

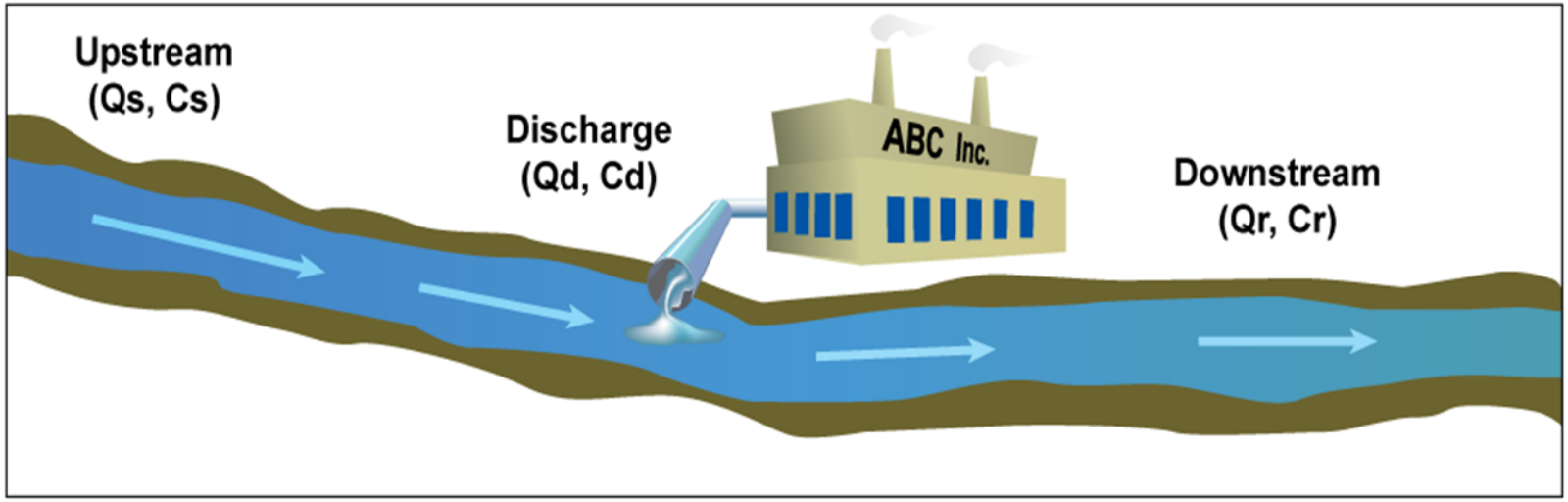
Wasteload Allocation from a TMDL or Other Watershed Analysis



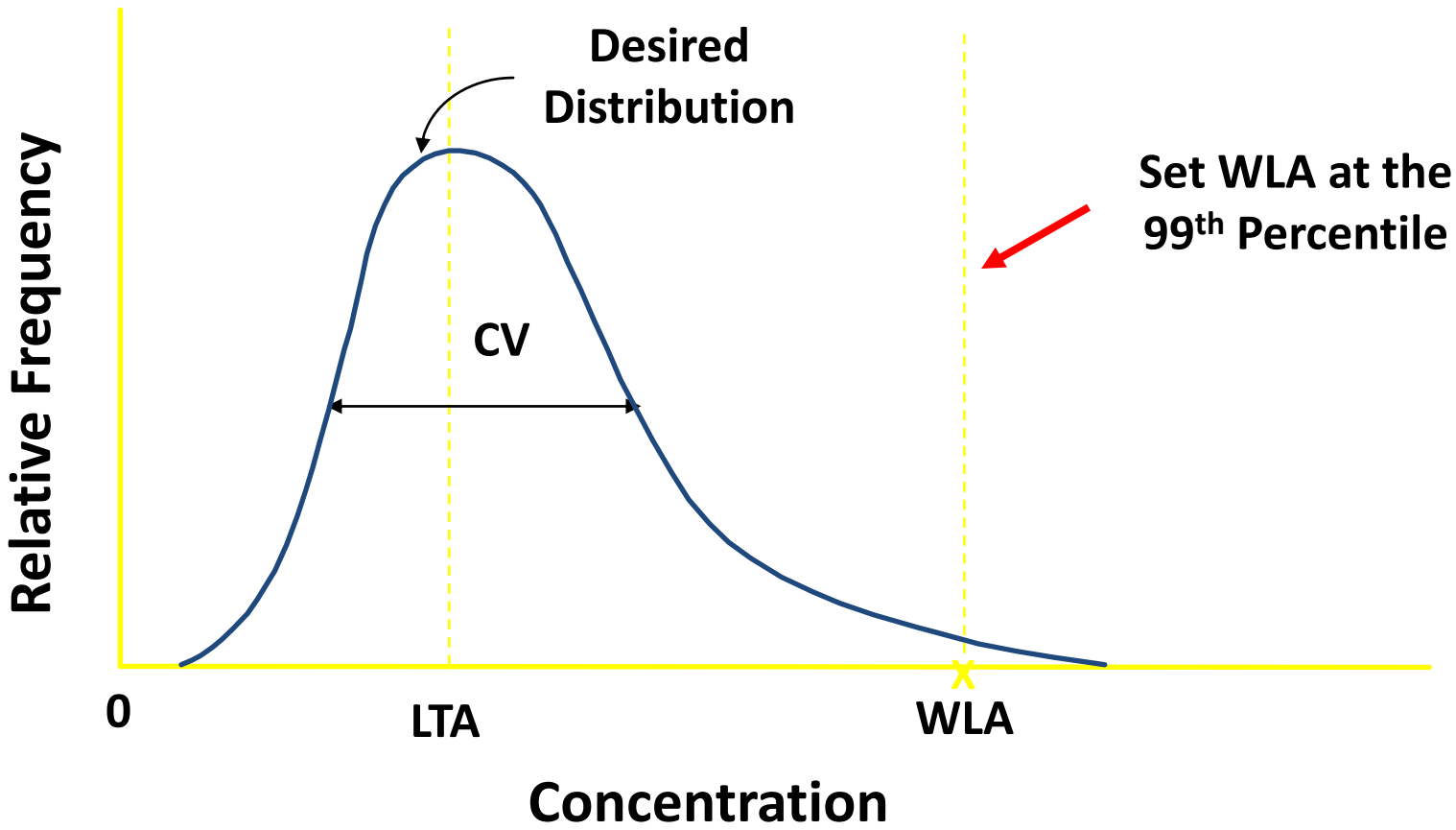
WLA = portion of the receiving water's TMDL allocated to a specific point source or an allocation to a point source determined from another watershed analysis

Wasteload Allocation from an Individual Facility Analysis

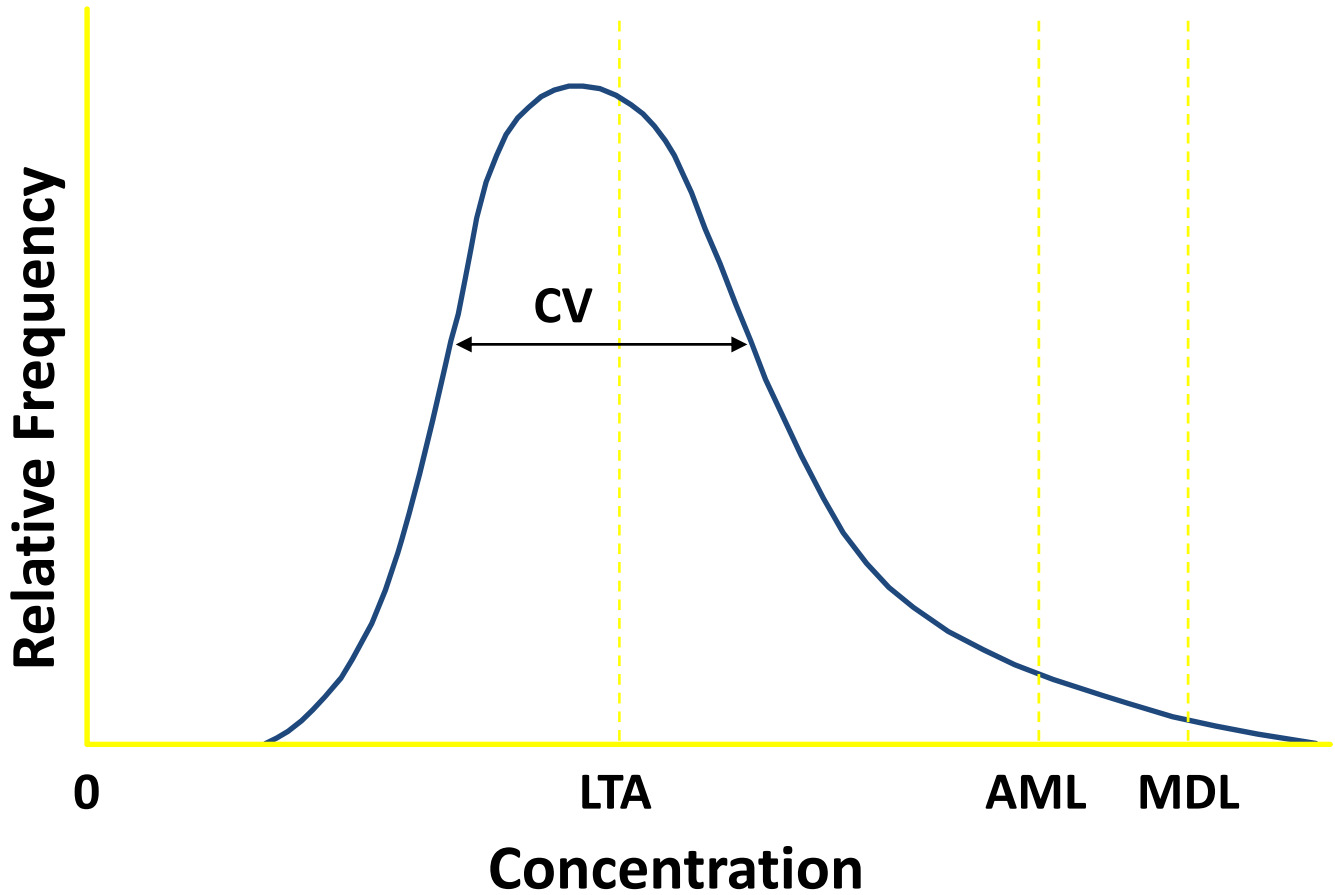
- Local water quality impacts
- Single point source
- Other sources considered in “background”
- Determine the maximum allowable discharge (i.e., the WLA) for the single facility



Characterize the Desired Distribution by LTA and CV



Calculate Effluent Limitations from the LTA and CV



Final Check

- Compare:
  - 1) WQBELs based on individual facility WLAs for all applicable criteria *with*
  - 2) TBELs or other existing limitations *with*
  - 3) WQBELs based on a TMDL or other watershed-based requirements
- The most stringent limitations for each parameter are the new, calculated final effluent limitations for that parameter
- Final effluent limitations in the permit must meet *antidegradation* and *anti-backsliding* requirements

For Additional Information:

- www.epa.gov/npdes
- Go to “Training and Meetings”
  - NPDES Permit Writers’ Course
  - Self-Paced Web Training
- David Hair
  - (202) 564-2287
  - hair.david@epa.gov
- Richard Remigio
  - (202) 566-0457
  - remigio.richard@epa.gov