



**Establishing Water Quality-based
Effluent Limitations in NPDES
Permits:
Part I—Identify Applicable Water
Quality Standards**

Today's Speakers

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Clean Water Act Requirements

- Section 101(a)
 - establishes **objective** of restoring and maintaining chemical, physical, and biological integrity of the Nation’s waters
- Section 101(a)(1), (2), and (3)
 - establishes **goals and policies**
 - eliminate the discharge of pollutants
 - fishable and swimmable waters (wherever attainable)
 - prohibit the discharge of toxic pollutants in toxic amounts
- Section 303(c)
 - framework for **water quality standards program**
 - requires **states, territories, and tribes** to establish water quality standards
- Section 304(a)
 - requires EPA to develop and publish **recommended water quality criteria**
- Section 301(b)(1)(C)
 - requires compliance with **effluent limitations necessary to meet water quality standards**



WQBELs Part I-3

Establishing WQBELs in NPDES Permits

Part I: Identify Applicable Water Quality Standards



Part II: Characterize the Effluent and Receiving Water



Part III: Determine the Need for WQBELs



Part IV: Calculate Chemical-specific WQBELs and Determine Final Limitations



WQBELs Part I-4

Establishing Water Quality Standards— 40 CFR Part 131

- States, territories, and tribes are responsible for adopting water quality standards for all waters of the United States [§131.4]
 - water bodies
 - segments of water bodies
- Standards are to be reviewed at least once every three years [§131.20]
- EPA has oversight authority
 - review and approval [§§131.5, 131.6, 131.21]
 - standards not effective until EPA approves [§131.21]
 - federal promulgation [§131.22]



WQBELs Part I-5

Water Quality Standards - 40 CFR Part 131

40 CFR 131.2

- A water quality standard defines the water quality goals of a water body, or portion thereof, by **designating the use or uses** to be made of the water and by **setting criteria** necessary to protect the uses



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Components of Water Quality Standards

Components of water quality standards include:

- Designated uses [§131.10]
- Water quality criteria [§131.11]
- Antidegradation policy [§131.12]
- General policies [§131.13] (optional)



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Designated Uses - 40 CFR 131.10

- Requires that water quality standards specify appropriate uses to be achieved and protected
- Common use categories
 - aquatic life habitat and propagation
 - wildlife propagation
 - recreation
 - primary
 - secondary
 - public water supply
 - agricultural water supply
 - industrial water supply
 - navigation

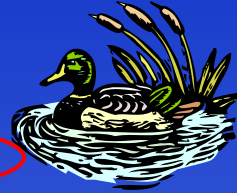


WQBELs Part I-8

Components of Water Quality Standards

Components of water quality standards include:

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- **Water quality criteria [§131.11]**
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EPA Water Quality Criteria

- EPA is responsible for establishing guidance and procedures (CWA Section 304(a))
 - establish and publish scientifically derived ambient criteria [CWA Section 304(a)]
 - 1968 Green
 - 1973 Blue
 - 1976 Red
 - 1980 Toxics
 - 1986 Gold
 - www.epa.gov/waterscience
 - establish procedures for deriving criteria



WQBELs Part I-10

Water Quality Criteria - 40 CFR 131.11

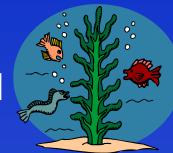
- **Numeric criteria**
 - Chemical- or parameter-specific
 - Aquatic life
 - Human health
 - Others (e.g., wildlife, sediment)
 - Whole effluent toxicity
 - Biological
- **Narrative criteria**



WQBELs Part I-11

Chemical / Parameter-Specific Criteria

- **Aquatic life criteria**
 - Designed to protect aquatic organisms, including animals and plants
 - Typically two types of aquatic life criteria
 - acute
 - chronic
 - Criteria are developed based on tests measuring effects on aquatic life



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Aquatic Life Criteria Components

- Generally, aquatic life criteria have three components:
 - **Magnitude** (concentration of concern of the pollutant)
 - **Duration** (time period that aquatic organisms would be exposed to the pollutant at the concentration of concern)
 - **Frequency** (how often aquatic organisms would be exposed to the concentration of concern for the duration of concern)



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Example of Aquatic Life Criterion Components

- For protection of aquatic life from acute effects from Pollutant X:
 - the 4-day average concentration (**duration**)
 - should not exceed 10 µg/L (**magnitude**)
 - more than once in 3 years on average (**frequency**)



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Other Factors Affecting Aquatic Life Criteria

- Some of EPA's recommended aquatic life criteria are dependent on other environmental factors.
- For example:
 - **Metals**
 - most criteria are a function of ambient hardness
 - **Ammonia**
 - acute criteria are a function of pH and presence or absence of salmonids
 - chronic criteria are a function of pH and temperature and the presence or absence of early life stages of fish
 - **Nutrients**
 - include both causative variables (phosphorus and nitrogen) and response variables (chlorophyll a and turbidity)
 - vary by ecoregion and water body type



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Water Quality Criteria - 40 CFR 131.11

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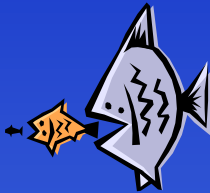
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Chemical / Parameter-Specific Criteria (continued)

- **Human Health Criteria**



- **Toxic Pollutants**



- single expression of the highest pollutant concentration not expected to pose significant long-term risk to human health
 - consider chronic exposure via:
 - consumption of aquatic life
 - consumption of aquatic life and water

- **Other Pollutants**

- generally shorter-term exposure (e.g., bacteria)



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Water Quality Criteria - 40 CFR 131.11

- **Numeric criteria**

- **Chemical- or parameter-specific**

- Aquatic life
 - Human health
 - **Others (e.g., wildlife, sediment)**

- **Whole effluent toxicity**

- **Biological**

- **Narrative criteria**



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Water Quality Criteria - 40 CFR 131.11

- **Numeric criteria**
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 - Others (e.g., wildlife, sediment)
 - Whole effluent toxicity
 - Biological
- **Narrative criteria**



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Whole Effluent Toxicity (WET) Testing

- **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 and saltwater)



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WET Criteria

- WET criteria are designed to prevent acute and chronic toxic effects on aquatic life from the mixture of pollutants in an effluent
- Some states establish numeric WET criteria and others rely on narrative criteria to address WET
- For more information on WET see EPA's Web sites
 - www.epa.gov/npdes
 - www.epa.gov/waterscience



WQBELs Part I-21

Water Quality Criteria - 40 CFR 131.11

- **Numeric criteria**
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 - Whole effluent toxicity
 - **Biological**
- **Narrative criteria**



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Biological Criteria

Biological criteria are:

- quantitative expressions of the desired condition of the aquatic community
- derived using data from sites representing the least impacted attainable condition for a specific waterbody type within an ecoregion or watershed
- traditionally use benthic invertebrate and fish sampling
- www.epa.gov/waterscience/biocriteria



WQBELs Part I-23

Water Quality Criteria - 40 CFR 131.11

- **Numeric criteria**
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 - Whole effluent toxicity
 - Biological
- **Narrative criteria**



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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
 - Waters must be **free from** discoloration that causes nuisance or adversely affects designated uses
 - Waters must be **free from** floating material in amounts that cause nuisance or adversely affect designated uses

WQBELs Part I-25



Components of Water Quality Standards

Components of water quality standards include:

- Designated uses [§131.10]
- Water quality criteria [§131.11]
- **Antidegradation policy [§131.12]**
- General policies [§131.13] (optional)



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Antidegradation Policy - 40 CFR 131.12



- An **antidegradation policy** is a required component of water quality standards
 - Tier 1: protects **existing uses**
 - Tier 2: protects **high quality waters**
 - Tier 3: protects **Outstanding National Resource Waters**
- Each state, territory, or tribe is required to adopt an antidegradation policy as part of its water quality standards and to adopt a **method of implementation**



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Implementing Antidegradation Policies in NPDES Permits

- Determine which “tier” the receiving water falls under
 - water body
 - parameter-by-parameter
- When determining effluent limitations, conduct appropriate analysis for the applicable tier
- **Document** all decisions



WQBELs Part I-28

Components of Water Quality Standards

Components of water quality standards include:

- Designated uses [§131.10]
- Water quality criteria [§131.11]
- Antidegradation policy [§131.12]
- **General policies [§131.13] (optional)**



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General Water Quality Standards Policies – 40 CFR 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



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Modifying Water Quality Standards

- **Can water quality standards be modified?**
- **Answer:** It depends. Permit writers should be aware that water quality standards can be modified in several different ways—some **permanent** and some **temporary**.



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Role of the Permit Writer

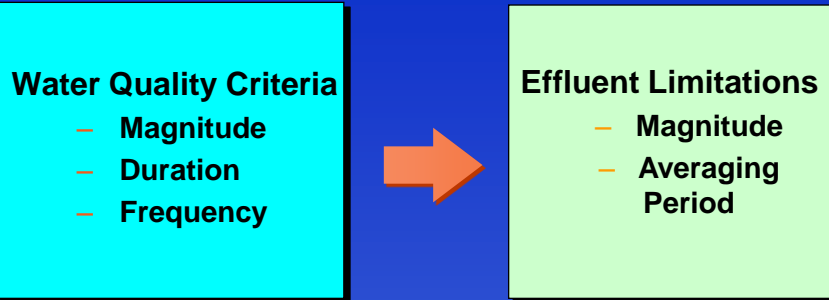


- Role of the permit writer is to implement water quality standards in NPDES permits by:
 - knowing the current water quality standards, including any recent changes
 - being familiar with water quality standards implementation policies
 - using procedures adopted by the permitting authority to establish limitations as stringent as necessary to attain water quality standards



WQBELs Part I-32

Relationship Between WQS and Effluent Limitations



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.



WQBELs Part I-33

WQS Implementation Procedures

- Water quality standards and their implementing procedures (including NPDES requirements) specify methods for determining the need for WQBELs and for calculating WQBELs that ensure that standards are attained.
- Where can these methods be found?
 - state regulations
 - state water quality management plans
 - state guidance
 - EPA's *Technical Support Document*



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Feedback and Other Presentations

Questions or comments?

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