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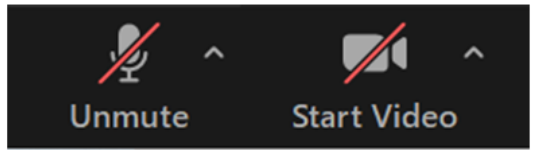

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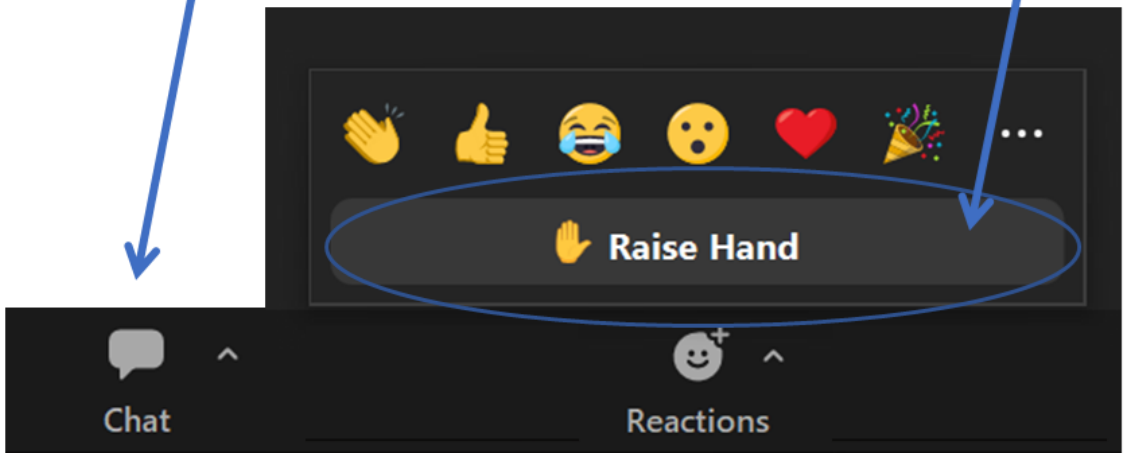

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Antidegradation
The Most Misunderstood Water Quality Standard

November 20, 2025

This program is made possible under a cooperative agreement with US EPA.

Presentation Summary

I'm just a soul whose intentions are good
Oh Lord, please don't let me be misunderstood

-The Animals *and Others*-

Those of a certain age will remember this song…
Otherwise check out Spotify, YouTube, or another streamer

Antidegradation (AD) - A Bit of History

- Why is AD most misunderstood part of water quality standards (WQS)?
  - While a WQS, implementation is usually associated with NPDES permits
- The term Antidegradation never included in the 1972 Clean Water Act
  - The term was finally amended into the CWA in 1987
- The concept was in the Water Quality Act of 1965
  - Dept of Interior policy -"Non-Degradation" of Interstate Waters
  - Maintain existing quality unless degradation is "justifiable"
- AD *Regulations* first adopted in 1983
  - Justified as supporting the CWA goal to
    - *"restore and maintain the chemical, physical, and biological integrity of the Nation's waters"*
  - Short regulation – not much detail, but eventually 200+ guidance documents!

A Bit of History

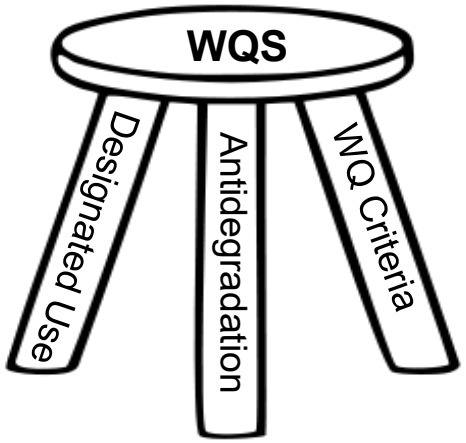
- In 2010, EPA proposed revised AD regulation (and other WQS)
  - States and others objected to proposed AD language and other items
    - States main objections
      - Use of “least degrading alternative”
      - Adopting Implementation Guidance as regulation
  - Office of Management and Budget (OMB) asked to meet with states
    - 4 State representatives met with OMB – I was one of the 4
      - The outcome - OMB did not allow EPA to finalize AD and other WQS regs
  - EPA contracted WEF to hold facilitated WQS discussions between states/EPA
    - After 3 years, a conceptual draft rule was developed between states and EPA
    - OMB would not allow release of the proposed rule for comment w/o sign off by states
      - 2 State representatives met with OMB and acknowledged states’ concurrence – (I was 1 of the2)

A Bit of History

- In Aug 2015 the WQS rule was adopted - became effective in Oct 2015
  - Addressed
    - Administrator's determination that new/revised WQS for states and tribes necessary
    - Designated uses of waters
    - Triennial reviews of state and authorized tribal WQS
    - Antidegradation provisions to protect water quality
    - WQS variances
    - Permit compliance schedules authorizing provisions
  - Response to comments – 14 *Essays*, 460 pages (AD specifically – 151 pages)
  - AD added a couple of key elements
    - Alternatives Analysis
      - Thanks to states – a *lesser* degrading alternative specified in lieu of the *least degrading*
    - Required Implementation Procedures
      - Because of states – don't have to be adopted in regulation

So, What Does the Reg Tell Us?

- Often described as one of three legs of the WQS stool - it is a WQS



1. **Designated Uses** - 40 CFR 131.10
   - Uses assigned to surface – e.g. Recreation, Aquatic Life Support, etc.
2. **WQ Criteria** - 40 CFR 131.11
   - Levels of water quality that support designated uses
     - Numeric - e.g. Dissolved Oxygen (DO) = 5 mg/L
     - Narrative – e.g. "*Surface waters shall be free of deposits of sludge or fine solids attributable to artificial sources of pollution*."
3. **Antidegradation Policy and Implementation Methods (AD)** - 40 CFR 131.12
   - Framework for maintaining and protecting WQ that has been achieved
     - Policy establishing protection of existing uses and maintaining high quality waters
     - Implementation Procedures for the AD policy must have public involvement

What is Antidegradation? – An Excellent Summary

- The 1995 WQS Economic Guidance may sum it up best

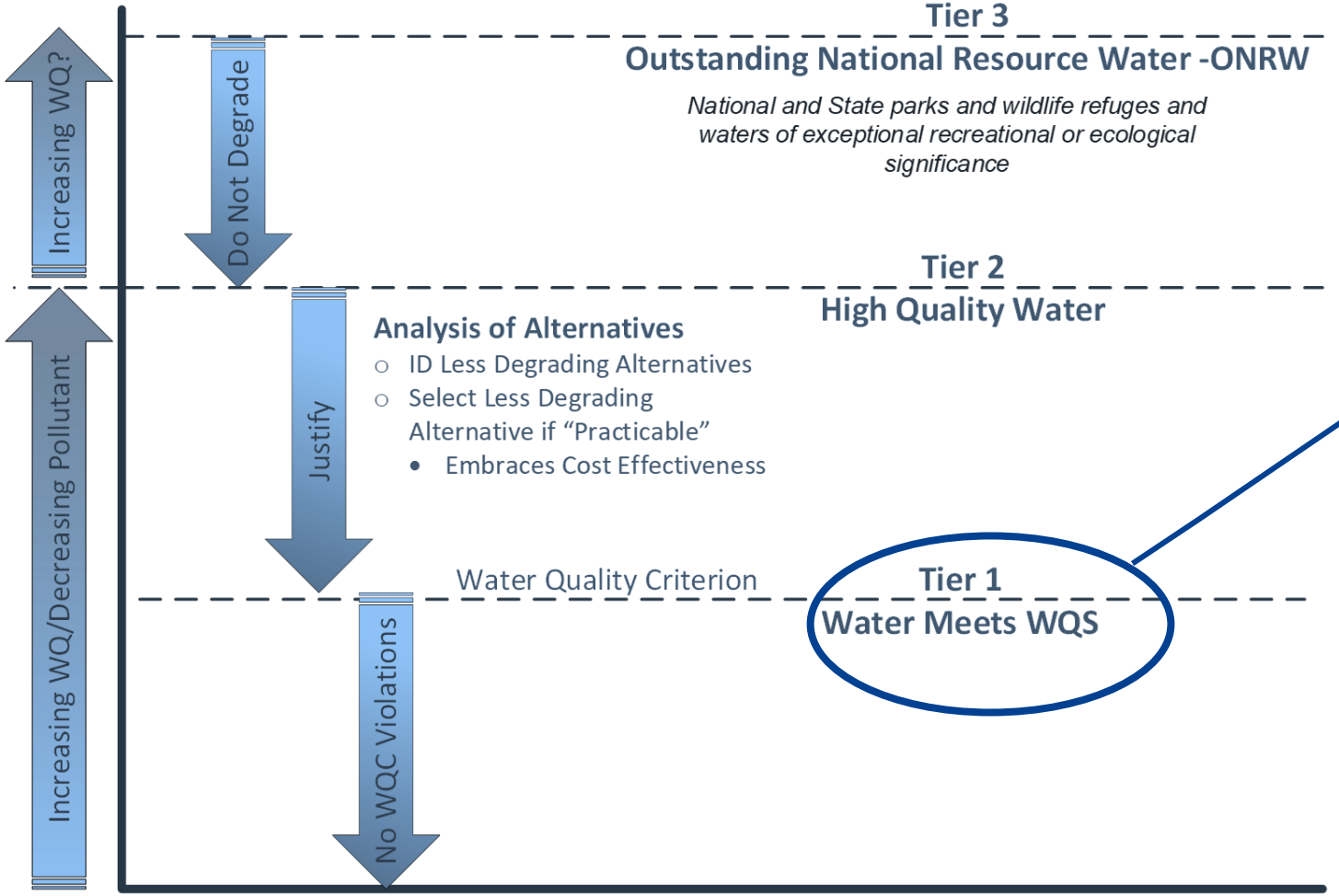
  Antidegradation is not a "no growth" rule and was never designed nor intended to be one. It is a policy that allows the public to make decisions about important environmental actions. Where the State intends to provide for development, it may decide that some lowering of water quality in "high-quality waters" is necessary to accommodate important economic or social development. Any such reduction in water quality, however, must protect existing uses fully and must satisfy the requirements for intergovernmental coordination and public participation.

What is Antidegradation?

- Minimum of 3 Tiers – *Federal* regulation
  - Tier 3
    - Outstanding National Resource
      - High Quality, or
      - Exceptional significance
        - Ecological, or
        - Recreational
  - Tier 2
    - Exceeds WQC to meet uses
  - Tier 1
    - Minimal to meet uses
    - Must meet all WQC
- Many *States* have 4 Tiers

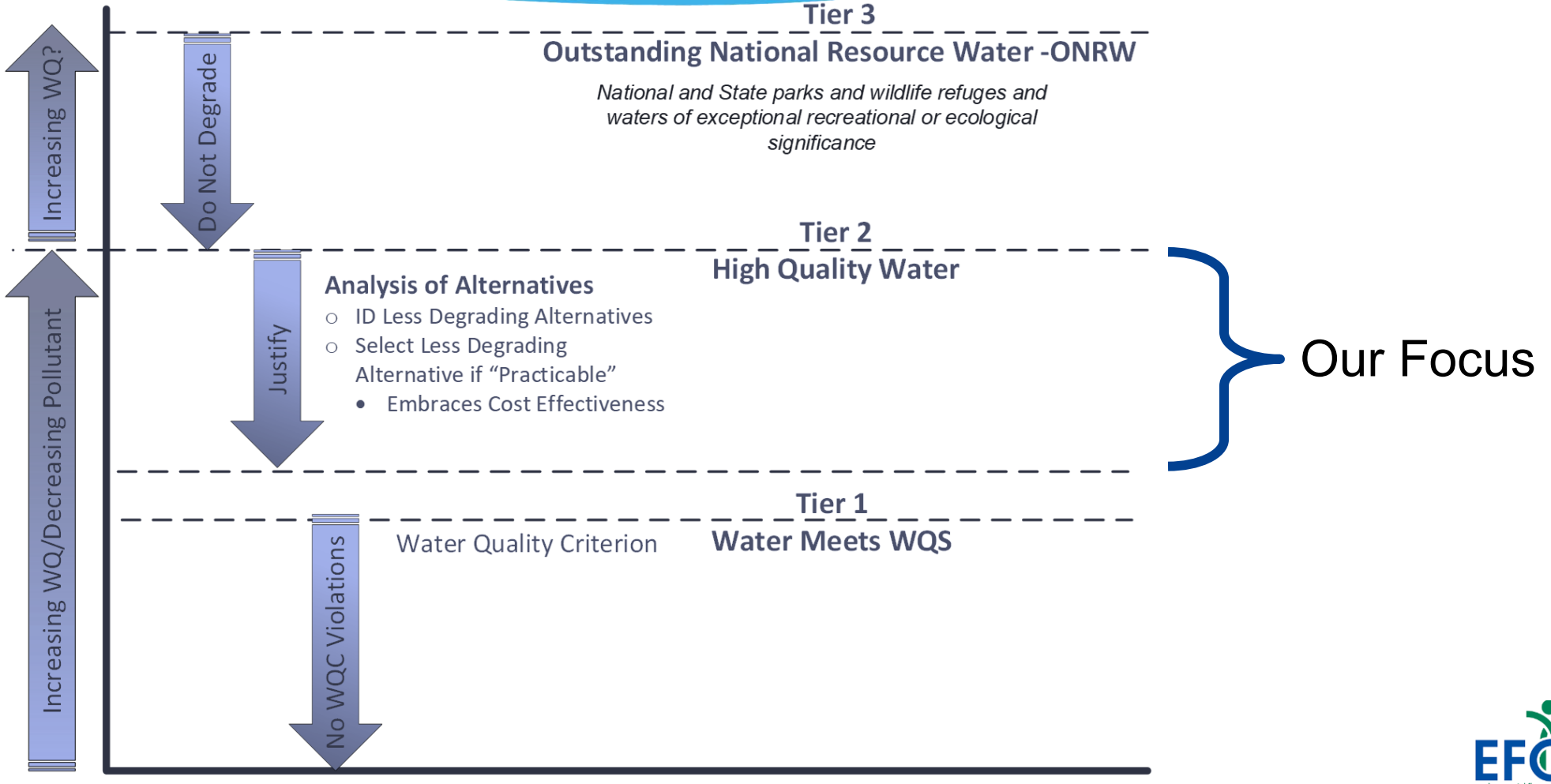
Outstanding National Resources Water (ONRW). High quality or of exceptional recreation or ecological significance. No additional pollutant.	**Tier 3**
State-created Tier – not in federal regulation. Outstanding resource but may add pollutant load after enhanced review.	**Tier 2.5**
High Quality Water – Exceeds quality necessary to support designated use. Quality shall be maintained and protected unless a lowering of quality is needed to support economic or social development.	**Tier 2**
Existing quality meets designated uses and shall be maintained and protected.	**Tier 1**
TMDL to return water to Tier 1.	**Impaired**

What is Antidegradation?



Is this a single point – i.e., the WQC? Or is it a range?

What is Antidegradation?



What is Tier 2?

- Tier 2 is where NPDES permitting really comes into play
  - **For new and expanded discharges**
- Recall Tier 2 waters are those where WQ exceeds the criterion
  - Better than needed to meet designated uses – i.e., high-quality water
- How is high quality defined?
  - Waterbody-by-Waterbody (W-b-W)
    - The waterbody is defined as either Tier 1, 2, or 3 regardless of pollutant
  - Pollutant-by-Pollutant (P-b-P)
    - Evaluate whether WQ exceeded for each pollutant in a waterbody
      - Probably at least one pollutant is below the WQ criterion in a waterbody
      - This means a waterbody could be high quality for ammonia, but not E. *coli*., or Zn, or...

Tier 2 Waterbody-by-Waterbody

- Waterbody-by-Waterbody (W-b-W)
  - Only a couple of states define all their waterbodies by Tier
    - Simplifies life
  - So, why do only a couple of states have published Tiers?
    - States essentially must look at WQ of “existing use” when defining Tiers
    - “Existing Use” is defined as the use as it was on November 28, 1975
      - By the time states figured this out, too late to go back in time to 1975 to assess
  - Some states tried to define non-high-quality waters as those with TMDLs
    - If TMDL, then Tier 1 and everything else as Tier 2 or 3
      - Their reasoning was that impaired waters are obviously not high quality
    - Courts have said NO – multiple times

Oklahoma W-b-W

APPENDIX A.2 DESIGNATED BENEFICIAL USES OF SURFACE WATERS
Water Quality Management Basin 2, Lower Arkansas River Basin

Waterbody Name and Sequence	Waterbody ID Numbers	Water Supply	F&W Prop	Ag	Rec	Nav	Aes	Limitations	Remarks
Arkansas River from the Arkansas State Line to the mouth of the Canadian River including R.S. Kerr Reservoir	220200010010, 220200020010, 220200020020	PPWS	WWAC	•	PBCR	•	•		
Lee Creek downstream from the 420 ft. elevation level	220200050010_00	PPWS	CWAC	•	PBCR		•	HQW	HQW
Lee Creek upstream from the 420 ft. elevation level	220200050010_10	PPWS	CWAC	•	PBCR		•	ORW	Scenic River(1)
Webber(s) Creek	220200050020	PPWS	CWAC	•	PBCR		•	ORW	
Briar Creek (Bear Creek)	220200050030	PPWS	CWAC	•	PBCR		•	ORW	
Little Lee Creek	220200050040	PPWS	CWAC	•	PBCR		•	ORW	Scenic River
Jenkins Creek	220200050050	PPWS	CWAC	•	PBCR		•	ORW	
Poteau River downstream from Brazil Creek	220100010010	PPWS	WWAC	•	PBCR		•		
Tributary of Cedar Creek at Sec. 8, T9N, R27E, IM	220100010030		WWAC	•	PBCR		•		
Hoil-Tuska Creek including New Spiro Lake	220100010050	PPWS	WWAC	•	PBCR		•	SWS	NLW
James Fork	220100010070	PPWS	WWAC	•	PBCR		•		
Brazil Creek	220100030010	PPWS	WWAC	•	PBCR		•		
Red Oak Pit	220100	PPWS	WWAC	•	PBCR		•		
Poteau River upstream from Brazil Creek	220100010010, 220100020010_10	PPWS	WWAC	•	PBCR		•		

HQW = High Quality Water (Tier 2)
ORW = Outstanding Resource Water (Tier 3)
SWS = Sensitive Water Supply (Tier 2.5)

Tier 2 Pollutant-by-Pollutant

- Pollutant-by-Pollutant (P-b-P)
  - Used by most states
  - You do not have to look at all 120+ pollutants with promulgated WQC
    - First, you need to reach agreement with regulator on *pollutants of concern* (POCs)
      - Those are the pollutants considered to be at levels making the water "high quality", and
      - Potentially in the wastewater effluent
        - Thus, POCs must be evaluated for alternative treatment
    - After identifying POCs, regulator should provide:
      - Background concentrations of pollutants in your waterbody
      - Whether TMDLs exist in your waterbody and the allowed load

Antidegradation Analysis Process Overview-IMO

1. Determine whether AD applies to your discharge
2. Determine whether the discharge is “important”
3. Determine pollutants of concern (POCs) in coordination with regulator
   - Concurrently seek probable permit limits from regulator
4. Develop high level design/cost to meet probable permit limits – base case
5. Identify/Develop lesser degrading alternatives/costs
6. Identify any lesser degrading alternatives that are “*practicable*”
7. Any *practicable* alternatives?
   - Yes – select a lesser degrading alternative
   - No – select the base case

Antidegradation Analysis Process Overview-IMO

8. Submit AD analysis to regulator
9. Discuss with regulator and modify as needed
10. Regulator will public notice draft permit and AD analysis
    - Permit will propose limits based on regulator-approved AD analysis
    - Public will have opportunity to comment on the permit and AD analysis
11. Based on public comment, regulator will:
    - Issue permit as proposed
    - Issue modified permit
    - Deny permit

Antidegradation Analysis Process Detail- IMO

1. Does AD apply to your discharge?
   - New or expanded discharge to Tier 2 (high quality) water?
2. Is the discharge "important"?
   - Remember, from earlier
     - States *may decide that some lowering of water quality in "high-quality waters" is necessary to accommodate important economic or social development*
     - To me, any new or expanded discharge degrades (mass, concn., or temperature), so
       - The first step should be to show the state the discharge is necessary to accommodate
         - Important economic development, or
         - Important social development
           - As a general rule, engineers hate this ☺
         - Discuss your approach with the regulatory agency
       - How can you do this?
         - Not as difficult as you might think

AD Process - Social or Economic Development

- Important social development
  - Providing improved treatment = improved WQ
  - Allow town to grow
    - Community growth provides more tax dollars to improve quality of life
- Important economic development
  - Town wanting to provide capacity for industry to grow economy
  - Town wanting to provide capacity to grow population/tax base
  - New/expanded businesses providing jobs to locals
  - New/expanded businesses providing more tax dollars to town allowing more and better services
- Note: No matter how "important" a new or expanded discharge is
  - Existing uses/water quality criteria must be maintained
    - You can't impair a water just because a discharge would be important

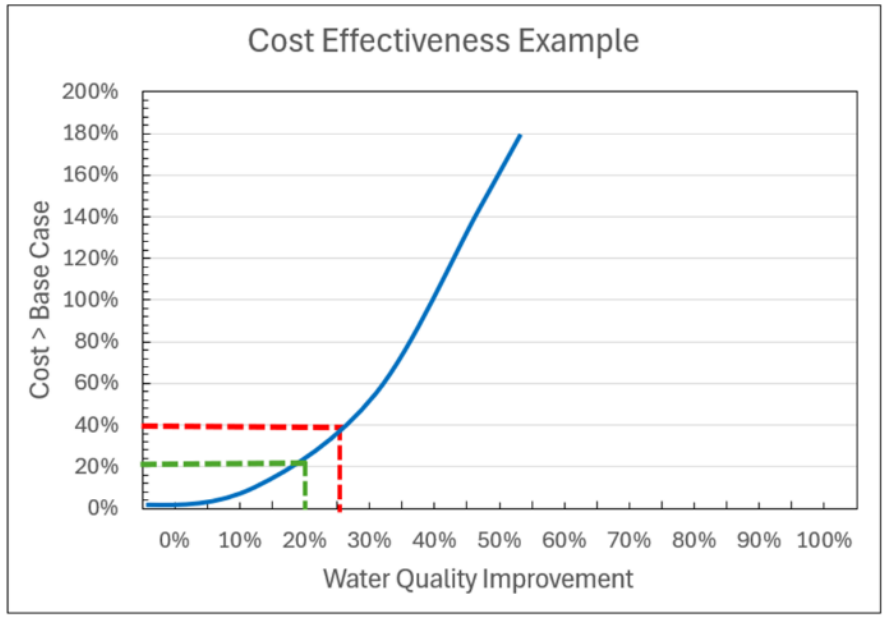
Antidegradation Analysis Process Detail- IMO

3. In conjunction with regulator, identify Pollutants of Concern (POCs)
   - Seek probable permit limits from regulator
4. Develop high level WWTF concept to meet permit limits
   - Call this the "*base case*"
     - It just meets WQS/maintains the designated uses of the receiving water
   - Cost out base case
5. Identify/Develop *lesser* degrading alternatives and costs
   - Concept level design
6. Identify lesser degrading alternatives that are "practicable"
   - *A range of practicable alternatives that would prevent or lessen the degradation*


PRACTICABILITY
DETOUR

Antidegradation - Practicability

- Practicable is specifically defined in the Federal rule to mean
  - *…technologically possible, able to be put into practice, and economically viable*
  - States wanted to use *cost effective* instead of *economically viable*, but lost out
    - EPA in *Essay 7* stated *economically viable* could be interpreted as *cost-effective*



- 20% increase in cost gives
  - 20% increase in WQ
- 40% increase in cost gives
  - 25% increase in WQ

- Diminishing return in WQ improvement when cost is 20% above the base cost

Antidegradation - Practicability

- Identifying a range of alternatives that prevent or lessen degradation
  - Prevention usually means no-discharge
    - Example might include:
      - A large lagoon system that can evaporate wastewater; or
      - Irrigation/reuse of wastewater
    - Often not technologically possible
    - More often, too expensive
  - Lesser degrading alternatives are up to the AD author to select
    - *Lesser degrading* was a compromise – initially the reg required the *least degrading*
      - Generally (IMO), there is something *practicable* that can improve WQ
      - So, if only wildly expensive alternatives are chosen, may be asked to look at others

Antidegradation in Permitting – Economic Viability

- Some states try to arbitrarily define economic viability as 1.X % of base case
  - Not viable if >115% of base case threshold exceeded – disapproved in IA
  - Is viable if <120% of base case threshold exceeded
    - So, what if 121% of base case cost produced a 70% improvement in WQ?
- % threshold concept is incorrect inference from 1993 EPA R8 guidance
  - R8 did excellent guidance document since nothing else existed at the time
  - It set up a *non-binding* Rule-of-Thumb

    " *…non-degrading or less-degrading pollution control alternatives with costs that are less than 110% of the costs of the pollution control measures associated with the proposed activity shall be considered reasonable*."
  - I interpret as *inclusive*
    - If only 10% more, you need to build the less degrading option – *shall be considered reasonable*
  - Some states try to use as *exclusive*
    - If it costs 10, 15, 20% more you don't have to build less degrading – easy-peasy
    - Not what the guidance said

Antidegradation in Permitting – Economic Viability

- Other problem with "% above or below" concept
  - Engineering estimates for concept-level studies
    - Can legitimately add a 30-100% contingency for Concept Screening (Level 5)
      - Could economic viability thresholds estimates be gamed just using accepted contingencies?
- Don't make rejecting all alternatives the goal of the analysis
  - Look for truly viable alternatives and fairly estimate cost
    - *"When the analysis of alternatives identifies one or more practicable alternatives, the State shall only find that a lowering is necessary if one such alternative is selected for implementation."*

Antidegradation Analysis Process Detail- IMO

7. Identify practicable alternatives – Be creative!
   - Cost out each alternative
     - Present value of capital and O&M
   - Identify degree of degradation from each alternative
   - If a lesser degrading practicable alternatives has *reasonable* additional cost
     - Just do it
   - If there is no practicable alternative
     - Recommend the base case
       - Think about how you justify no practicable alternatives
         - If solely on cost, be prepared to use EPA Economic Guidance (MHI-based)

Antidegradation Analysis Process Detail- IMO

8. Submit AD analysis to regulator
   - Hopefully, no surprises if regulator has been involved
9. Discuss with regulator and modify as needed
10. Regulator will put on public notice a draft permit and AD analysis
    - Permit will propose limits based on regulator-approved AD analysis
    - Public will opportunity to comment on permit and AD analysis
11. Based on public comment, regulator will:
    - Issue permit as proposed
    - Issue modified permit
    - Deny permit

} What typically happens / Move ahead with design/construction

Antidegradation – A Simplified Summary

- The goal is to keep high quality waters as high a quality as practicable
- If proposing an *important* new or expanded discharge to a high-quality water
  - Look at alternative treatment schemes that:
    - Lessen degradation of that high quality water; and
    - Are practicable
  - If there are practicable alternatives – select one
  - If there are not practicable alternatives
    - Be able to justify that
    - Make sure the discharge maintains existing uses/water quality

Use Antidegradation As a Tool To Improve Water Quality

Its Intentions Are Good!

Questions/Comments!

Thank You!

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