

Colorado Antidegradation Review Process

Issue: Alternatives Analysis

WQCD Primer Question: What information is necessary to support an alternatives analysis and how will that information be evaluated to determine whether degradation of existing water quality is appropriate?

Proposed Refinement of Issue: How can the Alternatives Analyses be streamlined to reduce the cost, uncertainty, and investment of time required for both the state and the dischargers?

Concerns:

It is not clear what alternatives must be evaluated. Furthermore, it is not clear how alternatives should be evaluated to derive alternative effluent limits that can be selected within the range between the Water Quality Based Effluent Limits (WQBELS) and the Antidegradation Based Average Concentrations (ADBACs).

Few dischargers have submitted Alternatives Analyses. Most have accepted status quo limits, either in the form of No Impact Limits (NILS) reflecting current effluent quality or ADBACs reflecting baseline plus 15 % of the increment between baseline and the water quality standard.

The few dischargers that have prepared Alternative Analyses report that the analyses were expensive, that the Division was unclear on what was needed and asked for more information without confirmation of what was already provided, and that the process took a long time.

Recommendations:

A checklist should be developed to clarify and simplify the process. The checklist should include the off-ramps, the alternatives that are generally considered not reasonable, the potential alternatives that should be considered, and economic reasonableness benchmarks.

As a Division or Commission policy decision, certain alternatives should be deemed not reasonable alternatives. Other potential alternative treatment measures should be identified for their capacity to reliably meet defined low concentration limits before any analysis by individual dischargers is required.

Additional supporting documentation and analysis, including a proposed checklist for consideration and discussion, follow.

Supporting Documentation and Analysis

The Basic Standards (Regulation 31) identify the following list of factors that the Water Quality Control Commission directs the Division to consider in determining the necessity of degradation and economic reasonableness of potential treatment alternatives.

Necessity of Degradation

- Area in which the waters are located.
- Whether the proposed regulated activity is important for economic or social development.
- Whether the degradation is necessary to accommodate the development (There are no water quality control alternatives available that 1) would result in no or less degradation of the state waters and 2) are economically, environmentally, and technologically reasonable.)

Economic Reasonableness

- Whether costs of treatment alternatives significantly exceed costs of the proposed treatment.
- Whether user charges resulting from the treatment alternative would significantly exceed user charges for similarly situated publicly owned treatment works (POTWs).
- Whether the treatment alternative would have a significant adverse effect upon the projects' profitability or competitive position.
- Whether costs resulting from the treatment alternative would significantly exceed treatment costs for any similar existing dischargers on the same segment.
- The relative, long-term, energy costs and commitments and availability of energy conservation alternatives.

Using these general considerations, in a public process, effluent limits are selected from a range of potential limits that could be no more restrictive than the WQBELs or as stringent as that effluent limit necessary to prevent a significant degradation. To prepare for that public decision process, the information required can be voluminous, expensive to obtain, highly technical concerning the various alternative treatment methodologies being considered to mitigate the potential degradation, and difficult to evaluate as a matter of practicality and economic reasonableness.

EPA Region VIII's Antidegradation Guidance (August 1993 at p. 57) intends the antidegradation implementation to not pose an undue burden on the state:

EPA Region VIII believes that implementation of antidegradation tier 2 requirements need not pose an undue burden on the state and tribal agencies charged with administering surface water quality programs.

Yet, at page 59, the Guidance states that the applicant should provide substantive information pertaining to the costs and environmental impacts associated with available alternatives. EPA urges the states to identify reasonable and less-degrading (or non-degrading) alternatives as a part of the Tier 2 process.

The question is how can antidegradation implementation be made to not be an undue burden on the State and the dischargers? We propose that, as a matter of policy, many alternatives can be eliminated as impractical and unreasonable, as proposed below.

Colorado's Implementation of Alternatives Analyses

In Colorado, few Alternatives Analyses have been done. The most notable is by Littleton/Englewood for ammonia, copper, silver and lindane. Others include Cherokee for a new wastewater treatment plant, Monte Vista for ammonia compliance, and Eldorado Springs for a new wastewater plant to replace failed septic tanks. If there are others that are not generally known, they should be identified and reviewed to help identify means of simplifying the process.

A clear distinction should be made between those Analyses that are ammonia-based and metals-based. A distinction also should be made between renewal and new discharge permits.

Ammonia antidegradation-based effluent limits will be more restrictive than even the Water Quality-Based Effluent Limits required under the recently adopted ammonia criteria per EPA's 2007 Ammonia Criteria. How much of an issue is this more restrictive effluent limit? An illustration is the PEL for Fort Carson's permit, which shows WQBELs generally in the 5 to 6 mg/l range of total ammonia while the ADBACS range from 4 to 5 mg/l generally, but the extreme differences are in June and July where ADBACS of 5.5 and 4.7 mg/l are far more stringent than the 16 and 12 mg/l WQBELs. The primary cost incurred is for conversion of lagoons to mechanical plants to achieve the new ammonia criteria. Through a compliance schedule, that conversion is spread over a period of years, enabling financial management. The ammonia removal necessary to meet antidegradation limits may begin to move towards the total nitrogen removal potentially required (i.e., 0.01 to 1.0 mg/l range) by future nutrients requirements, but the additional design capacity necessary to detain water for significantly greater time periods is significantly increased. These increasingly lower concentrations of ammonia reduce the effectiveness of chlorination and require at some point the conversion to ultra violet treatment for disinfection purposes. This also increases the cost of compliance.

Metals Antidegradation Alternative Analysis so far is essentially a consideration of reverse osmosis, microfiltration and ultrafiltration treatment methods. All of these result in highly concentrated waste streams with no means of disposing of them. Because they are so costly, have significant waste disposal and loss of water consequences, the Alternatives Analysis is essentially a paper work exercise to justify no antidegradation based effluent limits more restrictive than water quality based effluent limits. Other potential alternatives are:

- (1) adopting pretreatment requirements if none already exist for industrial or commercial activities;

- (2) making current pretreatment requirements more restrictive, such as pollution prevention program or reductions in the maximum allowable headworks loadings and commensurate pretreater permit effluent limits reductions;
- (3) plumbing corrosion control requirements on water providers;
- (4) building code revisions to prevent the use of copper pipes;
- (5) prohibition on the sale and use of copper sulfate for sewer line clean out;
- (6) prohibitions on sale and use of other parameters of concern;
- (7) revised or supplemental treatment measures such as precipitation, active biological, ion exchange, chemical oxidation, lagoon-based precipitation, wetland filtration, etc.

Neither EPA nor Colorado has adopted an exhaustive list of alternative treatment measures along with an evaluation of their effectiveness or reliability at low concentrations of multiple metal parameters in effluent quality. EPA's 1987 "Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program" at pages 3-56 to 3-58 provides limited data concerning the different removal efficiencies of activated sludge, trickling filter and tertiary treatments for metals and organics. Those data were not updated but incorporated by reference in the EPA Region VIII 2004 "Local Limits Development Guidance." In that 2004 Guidance, at page 5-7, EPA states that "[r]emoval efficiencies are based largely on site-specific conditions such as climate, POTW design, operation and maintenance, plant conditions, and sewage characteristics. Therefore, EPA strongly suggests that site-specific data be used to calculate removal efficiencies." However, the only data a POTW collects for determining its removal efficiency is for those parameters subject to WQBELS and not all of the other parameters subject to antidegradation analysis. Generally, for POTWs, no treatment plant is designed to effectively and reliably remove metals to specific design levels. Thus, compliance with extremely low antidegradation-based effluent limits is problematic. Demonstrated practical results of reliable treatment should be necessary to select any particular treatment method as a "reasonable alternative" to evaluate in the antidegradation alternatives analysis.

Why are so few antidegradation analyses done? They are expensive. By example, the Monte Vista analysis cost \$10,000-15,000 for the engineer consultant to prepare the analysis, plus \$8,000-10,000 for the design of an activated sludge plant to replace the current lagoon (which was avoided), for a total of around \$25,000. This is for a community that was certifiably an "Economically Disadvantaged Community." (Average annual income of \$15,000.) Costs for other Analyses are approximately \$10,000 to \$12,000 for Cherokee, and approximately \$75,000 for Littleton/Englewood.

These analyses are expensive because there is no simple template, each community has its own options to evaluate, and there is great uncertainty concerning what the Division's decision criteria really will be. A strongly common comment from a few parties that prepared the above analyses was that their submittals always resulted in the Division asking for more information with no acceptance by the Division of the templates, structure, approach, or details of the submittals. On one submittal, one member of the Division said it was sufficient, only to have another member say it was significantly insufficient. Clearly, there is a lack of clear decision criteria.

PROPOSED ALTERNATIVES ANALYSIS CHECKLIST

This is a brainstorming list to initiate discussion of alternative treatment methods that should be considered not reasonable or practical as a matter of Commission or Division policy. Such a list of decision criteria will result in more certainty concerning the evidence to produce and how to focus limited resources in reaching quicker decisions.

To simplify the analysis process, a work group should seek to create an Antidegradation Review Process template or checklist or decision criteria that consists of generally the following elements:

1. Area in which the waters are located
2. Meeting the criteria that the project is important economic or social development is presumed where a POTW is concerned. (See Division's Guidance for that presumption.)
3. Exemption from analysis of one or more alternatives, or any alternatives intended to avoid significant degradation shall occur when:
 - a. POTW services "Economically Disadvantaged Community" such that any new treatment beyond that required for attaining Water Quality Based Effluent Limits (WQBELS) is presumed to cause unreasonable economic hardship.
 - b. Current permit's whole effluent toxicity limits are based upon an Instream Waste Concentration of 75-100%, which is evidence that no instream flow dilution-based assimilative capacity exists.
 - c. Fate and Effect Analysis demonstrates pollutant of concern returns to historic concentrations occurring on or about September 2000 after the next major tributary below the discharge point.
 - d. Naturally occurring background downstream of the discharge point exceeds the SCT used for determining a significant increase.
 - e. Effluent quality data for specific parameter(s) demonstrates no trend of increasing concentration, even though permit effluent limit is to increase due to changes in standard or effluent limit derivation.
 - f. Watershed-based wasteload allocations among point sources and load allocations of non-point sources for implementing antidegradation purposes justify no further reductions by the point source (e.g., construction of wetlands within downstream system acts as filter for removal of multiple parameters sufficiently to qualitatively accept no further alternatives analysis, pollutant trading).
4. The following treatment methods are not practical and available alternatives:

- a. Treatment by Reverse Osmosis, Microfiltration, Ultrafiltration, because (1) there is no economical means for disposal of the brine or waste due to its toxicity and volume, and (2) capital and operational costs are anticipated to be double the current treatment's capital and operational costs. For example, Pueblo's consulting engineer estimated costs for selenium removal with Reverse Osmosis just to attain WQBELs at \$250 million in capital costs (including brine disposal), as compared to the new cost construction of the current plant with proposed ammonia and nitrogen removal of \$75 million. RO is 230% greater in cost. RO operational costs are 280% greater. Cherokee's basic secondary treatment plant cost would be \$14.27 million, as compared to the RO treatment and disposal costs of \$46.32 million. Note that 420 acres of lined evaporation ponds are necessary to accommodate disposal of 960,000 gpd of reject water and 1,075 acre-feet of water would be necessary under the water rights system to make up for the reject water lost to evaporation.
- b. Treatment methods beyond that necessary to meet WQBELs which increase energy consumption by greater than 20% of current levels, because such energy increase is impractical in the context of combating global warming.
- c. Treatment methods beyond that necessary to meet WQBELs and MCLGs such that they will prevent reuse for drinking water supply augmentation and are therefore impractical and in conflict with Colorado water rights laws.
- d. Treatment methods beyond that necessary to meet WQBELs having unintended consequences of increased water pollution that risk violating WQBELs or other ADBELs. For example, precipitation treatment methods may require a coagulant that has an incidental byproduct of increased effluent loading from the residue of the coagulant, such as iron or aluminum sulfates increasing iron, sulfates or total dissolved solids or total suspended solids.
- e. Treatment methods requiring additional land or space that is not available at the treatment plant site for intended design capacity to meet WQBELs at the treatment plant site within the next 30 year planning horizon, e.g., nutrients treatment will consume significant space and can preclude additional treatment for antidegradation purposes.
- f. Treatment methods requiring additional treatment that is not expected to be reliable in producing compliance with no more than one violation in a five year time block.
- g. Treatment methods that have been recognized as poor to fair to implement in other analyses that are analogous to the one at issue.
- h. Treatment by supplemental modes such as tertiary, precipitation, ion exchange etc shall not be deemed to be a reasonable alternative until EPA or the State produces documentation on the expected removal efficiencies of such methods for the parameters to which it is to be used.

i. Treatment methods are inconsistent with national, state, or local “Sustainability Goals” or programs, because water, chemical, energy, or other resources are consumed to such a degree that that such treatment method mitigation of degradation is not justified.

5. Potentially Practicable Alternatives to be evaluated include:

a. Pretreatment program adoption

b. Pretreatment program modification by expanding the number of users subject to permitting; by reduction in Maximum Allowable Headworks Loading and consequential reduction in allowable loading by pretreaters; by trading among pretreaters for greater reductions by largest sources; by local limits on water supplier; by corrosion control requirements on water supplier(s); by other prohibitions on sale and use of products within the service area.

6. Economic Reasonableness benchmarks for being unreasonable include:

a. Total sewer bill after treatment necessary to meet WQBELs and ADBELs would be greater than 30% of average wastewater bill of \$15.00 on a statewide basis, or 30% of the average rate within each size category used for setting fees paid to the state of Colorado.

b. Addition of antidegradation controls increases wastewater rates within five years of rate increases necessary for new ammonia criteria compliance.

c. Additional pretreatment requirements would unduly interfere with economic development of one or more pretreaters. (See EPA’s Questions and Answers #6) Undue interference occurs when additional treatment costs likely will cause competitive disadvantage because competitors are not subject to similar local limits.

d. Additional pretreatment requirements increase energy consumption rather than decrease it.