

**Antidegradation Significance Determination
for New or Increased Water Quality Impacts**

Procedural Guidance

**Version 1.0
December 2001**

This page intentionally left blank

Table of Contents

I.	Introduction.....	1
II.	Central Concepts of Antidegradation	2
	A. New or Increased Water Quality Impacts	2
	B. “Significant” Degradation.....	2
	C. Baseline Timeframe and Water Quality Characterization.....	3
	D. Alternatives Analysis	4
III.	Recent Changes to the Antidegradation Regulation	4
	A. Bioaccumulative Toxic Pollutant Test (31.8(3)(c)(i)).....	4
	B. Dilution Test (31.8(3)(c)(ii)(A))	4
	C. Concentration Test (31.8(3)(c)(ii)(B)).....	4
	D. Temporary Impacts Test (31.8(3)(c)(ii)(C)).....	4
IV.	Role of Antidegradation Review in CDPS Permitting.....	5
	A. Historical Perspective on Allocation	5
	B. Conflicts with Current Antidegradation Policy	5
	C. Resolution of Past Allocation Practices for Pollutants Discharged with a Permit Limit	5
	D. Resolution of Past Allocation Practices for Pollutants Discharged without a Permit Limit	6
	E. New Discharges to Waterbodies with Previously Allocated Assimilative Capacity	7
V.	Role of Antidegradation Review in 401 Certifications and General Permits..	7
VI.	Antidegradation Review Guidance	9
	A. Clarification of Terms	9
	B. Applicable Equations.....	11
	C. Overview of the Antidegradation Review Process.....	12
	D. Application of the New or Increased Water Quality Impact Screening Test for renewal CDPS Permits.	14
	E. Antidegradation Significance Determination Tests (section 31.8(3)(c)):	17
	1. Bioaccumulative Toxic Pollutant Test (31.8(3)(c)(i)).....	17
	2. Temporary Impacts Test (31.8(3)(c)(ii)(C)).....	18

- 3. Dilution Test (31.8(3)(c)(ii)(A)) 18**
- 4. Concentration Test (31.8(3)(c)(ii)(B))..... 18**
- F. Non-Bioaccumulative Toxic Pollutants: Application of Significance Tests and Calculation of Antidegradation-Based Effluent Limits for Renewal CDPS Permits. 18**
- G. Bioaccumulative Toxic Pollutants: Application of Significance Tests and Calculation of Antidegradation-Based Effluent Limits for Renewal CDPS Permits. 21**
- VII. Questions and Answers..... 25**

Acronyms

AA – Alternatives Analysis
AD – Antidegradation
ADBAC – Antidegradation-Based Average Concentration
ADBEL – Antidegradation-Based Effluent Limit
BAF – Bioaccumulation Factor
BAI – Baseline Available Increment
BMP – Best Management Practice
BWQ – Baseline Water Quality
CAS – Chemical Abstracts Service
CCR – Colorado Code of Regulations
CDPS – Colorado Discharge Permits System
CFR – Code of Federal Regulations
CWA – Clean Water Act
DDD– Dichloro-Diphenyl-Dichloroethane
DDE– Dichloro-Diphenyl-Dichloroethylene
DDT – Dichloro-Diphenyl-Trichloroethane
DF – Design Flow
EPA – United States Environmental Protection Agency
NEPA – National Environmental Policy Act
OW – Outstanding Waters
PCBs – Polychlorinated Biphenyls
POTWs – Publicly Owned Treatment Works
SCT – Significant Concentration Threshold
TCDD – 2,3,7,8-Tetrachlorodibenzo-p-dioxin
TL – Threshold Load
TMDL – Total Maximum Daily Load
UP – Use-Protected
U/S – Upstream
WQ – Water Quality
WQBEL – Water Quality-Based Effluent Limit
WQCC – Water Quality Control Commission
WQCD – Water Quality Control Division
WQS – Water Quality Standard
1E3 – Acute 1-day low flow over a 3-year period of record
30E3 – Chronic 30-day low flow over a 3-year period of record

This page intentionally left blank

I. INTRODUCTION

The Basic Standards and Methodologies for Surface Waters (Regulation No. 31, 5 CCR 1002-31) contains antidegradation provisions which provide three separate levels of antidegradation protection (see section 31.8). At a minimum, for all surface waters, the existing classified uses and the level of water quality necessary to protect such uses are to be maintained and protected. Waters that receive only this level of antidegradation protection are called “use-protected.” The highest level of water quality protection applies to certain waters that constitute an outstanding state or national resource. These waters are called “outstanding waters.” An intermediate level of water quality protection applies to waters that have not been designated outstanding waters or use-protected. These undesignated waters, known as “reviewable waters,” are to be maintained and protected at their existing quality unless it is determined that allowing poorer water quality is necessary to accommodate important economic or social development in the area in which the waters are located.

New or increased water quality impacts from regulated activities (including Colorado Discharge Permits System [CDPS] permits and 401 Certifications) to reviewable waters must undergo an antidegradation review. The initial step in the antidegradation review is the “Significance Determination.” New or increased water quality impacts to reviewable waters that are deemed “significant” must complete the antidegradation review including an alternatives analysis and a determination of whether the degradation caused by the regulated activity is necessary to accommodate important economic or social development in the area in which the waters are located.

This document is intended to provide guidance to Water Quality Control Division (“Division”) staff and to the public regarding the implementation of the antidegradation significance tests found in Regulation No. 31 at section 31.8(3)(c), as modified by the Water Quality Control Commission (“Commission”) in a July, 2000 rulemaking hearing. This guidance is designed as a framework to provide a documented methodology and to ensure antidegradation reviews are conducted in a consistent manner. Unique situations will be assessed on a case-by-case basis, using site-specific data and methodology.

This document is not intended to provide guidance on the alternatives analysis once an impact is deemed to be significant. Guidance regarding that process can be found in Regulation No. 31 at section 31.8(3)(d) and the accompanying Statement of Basis and Purpose for the 1988 revisions. Excerpts of these are provided in Section VII, Answer 40, at the end of this guidance document.

II. CENTRAL CONCEPTS OF ANTIDEGRADATION

Antidegradation provides three levels of protection for state waters. Outstanding Waters is the highest level of water quality protection. This designation is assigned to waters that constitute an outstanding state or national resource that must be maintained and protected at their existing quality (Regulation No. 31 at section 31.8(1)(a)). The Use-Protected designation is assigned to state waters and provides a level of water quality protection that ensures uses are maintained and protected. Use-protected waters are allowed to degrade to the level of the water quality standards. Undesignated waters, or reviewable waters, must be maintained and protected at their existing water quality unless a determination is made that degrading water quality is necessary.

The antidegradation regulation therefore provides a second layer of protection beyond the water quality standards for reviewable waters. These are waters that have not been designated outstanding waters or use-protected and have water quality that is, in general, better than the water quality standards. The assimilative capacity (the cushion between the ambient water quality and the water quality standards) is to be maintained and protected unless it is determined that allowing lower water quality is necessary to accommodate important economic or social development. The review is intended to limit future degradation and is not intended to be applied as a means to require remediation of impacts from regulated activities that occurred prior to enactment of the antidegradation regulation.

A. New or Increased Water Quality Impacts

It is important to note that an antidegradation review applies only to activities with new or increased water quality impacts. As stated in Regulation No. 31 at section 31.8(3)(a):

The antidegradation review procedures shall apply to the review of regulated activities with new or increased water quality impacts that may degrade the quality of state surface waters that have not been designated as outstanding waters or use-protected waters....

An antidegradation review and associated significance determination, is necessary only for regulated activities that will have a new or increased water quality impact. This includes new activities or facilities; expansion of existing activities or facilities resulting in an increased load over the current authorized load; or at the time of renewal, any increase in the authorized discharge levels (effluent limits) in a permit over the current authorized discharge levels.

B. “Significant” Degradation

Although virtually any impact on a waterbody could theoretically degrade the water, when the antidegradation regulations were developed, the Commission decided that a practical antidegradation policy should focus on the potential for “significant” degradation. If degradation is insignificant, they reasoned that

substantial administrative and private resources should not be devoted to prevent the degradation. Therefore, the criteria were designed to screen out insignificant impacts.

Establishment of a specific dividing line between "significant" and "insignificant" degradation was acknowledged to be somewhat arbitrary. The Commission believed that the specific criteria adopted were appropriate from a technical standpoint to assure that any substantial new degradation would be subject to the full antidegradation review process. The specific criteria are included in four significance tests: the Bioaccumulative Toxic Pollutant Test, the Dilution Test, the Concentration Test, and the Temporary Impacts Test.

C. Baseline Timeframe and Water Quality Characterization

In order to limit degradation, a benchmark or baseline must be established against which to judge the impact on water quality. The Commission established antidegradation regulations in 1979. Since the Commission's intention at that time was to begin limiting the erosion of assimilative capacity, it could be argued that 1979 would be the appropriate date upon which to base the evaluation. However, no date was specified at that time. The antidegradation regulations were substantially revised in 1988 and again, the concept of the baseline date was not clarified. This presented a problem of consistency for the Division when implementing these rules.

The newly revised (July 2000) regulations establish the date of September 30, 2000 as the baseline date (Regulation No. 31 at section 31.8(3)(c)(ii)(B)).

The baseline low-flow pollutant concentration shall represent the water quality as of September 30, 2000....

The baseline low-flow pollutant concentration is a characterization of water quality conditions that existed at the time of this regulation change.

The Division consistently characterizes ambient conditions by the 85th percentile of representative data. Since concentrations generally have an inverse relationship to flow (lower flows have higher concentrations), the 85th percentile is more representative of lower flow conditions. Therefore, the 85th percentile concentration is a representation of the baseline low-flow pollutant concentration. If sufficient representative low flow data is available, the 50th percentile of this low flow data may be used to characterize the baseline condition. A judgement as to which method should be used will depend on the stream characteristics and must result in the best characterization of the baseline low-flow concentration.

D. Alternatives Analysis

There are two possible results of a significance determination. If the water quality impacts of a new or increased discharge are determined to be insignificant, no further antidegradation review is required. If the impacts are determined to be significant, this does not necessarily mean that the new or increased discharge will not be allowed. Rather, it means the permittee must determine whether degradation is “necessary,” including an evaluation of alternatives.

III. RECENT CHANGES TO THE ANTIDEGRADATION REGULATION

As a result of the July 2000 Basic Standards Rulemaking Hearing, the antidegradation significance determination tests (Regulation No. 31 at section 31.8(3)(c)) were revised. No changes were made to the portions of the regulation that address the “Necessity of Degradation Determination” or alternatives analysis. A summary of the July 2000 changes to the significance determination tests is provided below.

A. Bioaccumulative Toxic Pollutant Test (31.8(3)(c)(i))

The test based on “10 percent of the existing load” was modified to apply specifically to bioaccumulative toxic pollutants, rather than under past regulation where it applied to all pollutants.

B. Dilution Test (31.8(3)(c)(ii)(A))

The dilution significance test remains unchanged.

C. Concentration Test (31.8(3)(c)(ii)(B))

The concentration-based “15 percent of the available increment” test was modified to consider the cumulative impact of discharges over a baseline condition. In order to be “insignificant”, the new or increased discharge may not increase the actual instream concentration by more than 15 percent of the available increment over the baseline. The Division is implementing this 15 percent cap as the significant concentration threshold or SCT. The baseline condition is set at September 30, 2000.

D. Temporary Impacts Test (31.8(3)(c)(ii)(C))

The “temporary or short-term changes” significance test was clarified to assure that an antidegradation review is required where the long-term operation of a short-term regulated activity will result in an increase in water quality impacts to the receiving waterbody.

IV. ROLE OF ANTIDEGRADATION REVIEW IN CDPS PERMITTING

The antidegradation review procedures apply to regulated activities that may degrade water quality. Currently, these activities include discharges that require CDPS permits or 401 Certifications. Generally, the significance tests involving pollutant concentrations and assimilative capacity allocations apply directly to CDPS permits while the temporary impacts significance test applies more directly to 401 Certifications.

A. Historical Perspective on Allocation

Many, if not most, existing domestic and industrial permits were initially written before the first set of antidegradation requirements were established by the Commission in 1988. Significant public and private infrastructure investments and land-use commitments were made in accordance with the implicit waste load allocations authorized by those original permits. The permits included water quality-based effluent limits established using a mass balance equation designed to result in attainment of water quality standards. In some cases, and through such permitting practices, the entire assimilative capacity (for certain pollutants) of some high quality waterbodies was allocated long ago.

B. Conflicts with Current Antidegradation Policy

There are many cases where the discharge levels have not reached the allocated level and baseline water quality does not reflect the authorized pollutant levels. Because the critical effluent flow condition employed in the mass balance equation is the maximum hydraulic capacity of the wastewater treatment plant; some permitted discharges may have not yet fully utilized their permitted waste load allocation. Therefore, the baseline water quality for the pollutants of concern may, at present, be better than the level necessary to achieve water quality standards. Nonetheless, if the permitted discharges were to fully utilize the waste load allocations that are implicit in their permit effluent and flow limitations, presumably, the water quality standards for the pollutants of concern in the permits would just be met in the receiving waterbody at critical flow conditions. The historic waste load allocations authorized in permit limits conflict with the antidegradation concept of maintaining and protecting the baseline water quality condition.

C. Resolution of Past Allocation Practices for Pollutants Discharged with a Permit Limit

It is the intent of this policy to reconcile past permitting decisions (that were based upon sound implementation of then-applicable regulatory requirements) with current antidegradation requirements. Of course, if errors in implementation of permitting requirements are discovered during the permit renewal process, they will be rectified as appropriate.

At the time of permit renewal for a discharge to reviewable waters, all of the relevant factors that are important in determining the appropriate effluent limitations will be evaluated. These factors include receiving waterbody quality, waterbody low-flow information, effluent quality and quantity, applicable water quality standards, relevant facility changes, situation of neighboring facilities, etc.

If the baseline water quality of the receiving waterbody is determined to be better than the water quality standards, but the assimilative capacity of the receiving waterbody for one or more pollutants had been previously allocated, the renewal permit(s) will be written in a manner consistent with past practices, provided that there is no increased load or concentration. In short, the purpose of the antidegradation review for those pollutants of concern will be to assure the applicable standards and classified beneficial uses are protected. For all other pollutants that have not been fully allocated through past permitting practices, the antidegradation analysis and review will be performed as detailed in this guidance document.

D. Resolution of Past Allocation Practices for Pollutants Discharged without a Permit Limit

Many permits do not include limits for all pollutants. More than likely in these cases, the pollutant was evaluated with a Reasonable Potential Analysis and it was determined that the pollutant would not be discharged at levels that would cause an exceedance of water quality standards. At the time of permit renewal, for those pollutants known to be in a discharge yet not explicitly limited in the permit, the Division will treat them as though there was an implicit waste load allocation; and that implicit waste load allocation will be used in the “New or Increased Water Quality Impacts” screening. If new or increased water quality impacts are not found, then for pollutants with implicit limits the permittee may elect to retain their implicit waste load allocation as an explicit waste load allocation.

The implicit waste load allocation will be estimated using the two-year average of 30-day average effluent concentration measurements and the design capacity of the plant. Implicit waste load allocations can be assigned only if adequate data exists to characterize the effluent. If effluent concentration data is not available, then data may be gathered by the permittee in order to make an allocation determination. For those pollutants undisclosed by the permittee and unknown by the Division to be present in the discharge, an implicit allocation or limit may not be recognized. This will be determined on a case-by-case basis.

This policy essentially grandfathers existing plants with their existing discharges as of September 30, 2000, so long as the waste load allocations are protective of water quality standards and uses. The permittee may choose not to retain their existing waste load allocation and may proceed to the remainder of the antidegradation review. In addition, during any antidegradation review, the

permittee may elect to not accept the antidegradation-based average concentration (the effluent concentration that would be considered insignificant) and may pursue the remainder of the review including the alternatives analysis. This issue is addressed in more detail in Section VI, F.

E. New Discharges to Waterbodies with Previously Allocated Assimilative Capacity

In a case where a new discharge is proposed on a reviewable waterbody where the significant concentration threshold for one or more pollutants has been previously fully allocated to other discharges to the segment, the new discharger may accept antidegradation-based effluent limits equal to the applicable significant concentration threshold for the receiving waterbody. If such limits are not feasible or acceptable to the new discharger, a reallocation process may be undertaken so that the impact of the new discharge plus the current discharges does not cause the quality of the receiving waters to exceed the significant concentration threshold. The Division encourages such reallocations to be negotiated at the local level or through regional area-wide water quality management agencies wherever they exist. In cases where acceptable local agreements for reallocating waste loads are not reached, the Division, one or more dischargers, or other interested party may propose a control regulation to allocate waste loads to a waterbody in accordance with a total maximum daily load (as per CWA section 303(d)(3)) and a suitable margin of safety. Any such control regulation would be established by the Commission following a public rulemaking process.

To summarize, for proposed increased discharges on a reviewable waterbody with baseline water quality that is better than the water quality standards, but where the significant concentration threshold for one or more pollutants has been previously fully allocated, a permittee may: (1) elect to accept the antidegradation-based effluent limits (which result in a determination that the discharge is insignificant); (2) negotiate reallocated waste loads with adjacent dischargers; (3) propose a control regulation to the Commission; or (4) pursue the alternatives analysis (see Section VII, Answer 40 at the end of this guidance document).

V. ROLE OF ANTIDEGRADATION REVIEW IN 401 CERTIFICATIONS AND GENERAL PERMITS

A. 401 Certifications

The antidegradation review procedures apply to regulated activities that may degrade water quality. Currently, these activities include discharges that require CDPS permits or 401 Certifications. The Division issues 401 Water Quality Certifications for Federal Dredge and Fill 404 Permits and Federal Energy Regulatory Commission Permits. For 401 Certifications, the permittee submits

the Army Corps of Engineers 404 Permit Application, site maps, and a list of the best management practices (BMPs) used in the project. The 404 Application includes an alternatives analysis. BMPs are an integral part of the project in order to protect the narrative and numeric water quality standards. For reviewable waters, the Division evaluates if the project will cause significant degradation and may issue a conditional certification in order to ensure the degradation caused has either temporary impacts or is insignificant.

Certifications of 404 permits most often focus upon the protection of narrative standards. This significance determination guidance is more focused on the protection of numeric standards.

Nationwide 404 permits are general permits and are issued 401 Certifications by statute by the State of Colorado; therefore, no individual 401 Certifications are issued by the State and subsequently no antidegradation review is required.

B. General Permits

The Division issues both General Permits and Individual Permits within the CDPS Program. General Permits are written and issued to address a class of discharges where standardized permit limitations will ensure that all regulatory requirements are met. Individual Permits are drafted for discharges where there are unique characteristics of the discharge or receiving water and specialized assessment and limitations may be necessary to ensure that all regulatory requirements are met. This antidegradation guidance document is focused on the significance tests for new or renewed Individual CDPS Permits. The significance tests for General Permits are not specifically described herein due to the nature of the classes of discharges which are addressed by General Permits.

Specifically, some of the General Permit groups include: Low Flow/Discharge Flow Dilution Ratio, Discharges to Segments with Limited Set of Standards, and Minimal Discharges. The first group mentioned above includes discharges to receiving streams with 100:1 dilution at low flow. One of the antidegradation significance tests is the dilution test which consists of the same criteria; 100:1 dilution at low flow is considered to result in insignificant impacts (Section VI (E)(3)). The next group includes segments with limited standards. Segments with an aquatic life classification and only standards for dissolved oxygen, pH and fecal coliform were evaluated during the standards adoption process for the presence of toxics. These segments with limited standards were already documented by the Division through repeated triennial reviews to lack sources or potential sources of priority toxic pollutants at levels that can reasonably be expected to interfere with designated uses. Most of these limited standards segments are designated use-protected in which case, an antidegradation review would not apply. The third group includes minimal discharges where the determination has already been made that the discharge will have an insignificant impact upon water quality.

There are some facilities discharging under a General Permit that have water quality-based effluent limits. Any discharge permit on a reviewable waterbody with water quality-based effluent limits that results in a new or increased water quality impact must undergo an antidegradation review as described in this document.

VI. ANTIDEGRADATION REVIEW GUIDANCE

This document is intended to provide guidance to Division staff and to the public regarding the implementation of the antidegradation significance tests found in Regulation No. 31 at section 31.8(3)(c), as modified as a result of a July, 2000 rulemaking hearing.

A. Clarification of Terms

Alternatives Analysis (AA): If the regulated activity is predicted to result in significant degradation, and the applicant is not willing to accept the effluent limits that result in insignificant degradation, the applicant must conduct an alternatives analysis. The alternatives analysis examines alternatives that may result in no degradation or less degradation and are economically, environmentally, and technologically reasonable. If the proposed regulated activity is determined to be important economic or social development, a determination shall be made whether the degradation that would result from such regulated activity is necessary to accommodate that development.

Ambient Conditions: Ambient water quality data for most parameters is usually based on the 85th percentile of representative data. In general, ambient data should be no older than five years. Older data may be used on a case-by-case basis, if such data is representative. In cases where significant changes have occurred in the watershed within the last five years, it may be appropriate to use a shorter period of record.

Antidegradation-based Average Concentration (ADBAC): The highest average effluent discharge level that results in insignificant degradation of downstream water quality. ADBACs are generally derived from a mass balance equation using the significant concentration threshold to protect the baseline available increment of the waterbody. The derivation and use of ADBACs is discussed in detail in Section VI, F and Section VII, questions and answers 7 and 15.

Antidegradation-based Effluent Limit (ADBEL): The potential limit resulting from the antidegradation review. This limit is usually set at the ADBAC or is based on the concentration associated with the threshold load (only for bioaccumulative toxic pollutants). If a permittee does not accept the ADBAC or the concentration associated with the threshold load and continues through the antidegradation review, the ADBEL is the antidegradation-based limit developed as a result of the alternatives analysis.

Antidegradation Designation: Waters are designated as either Outstanding Waters (OW), where no degradation is allowed; or Use-Protected (UP), where degradation is allowed to the water quality standard and antidegradation reviews aren't required. Reviewable waters are those waters with no designation, where only insignificant degradation is allowed unless the antidegradation review results in a justification for significant degradation.

Assimilative Capacity: The concentration increment between the ambient water quality and the water quality standard.

Baseline available increment (BAI): For the concentration test, the concentration increment between the baseline water quality and the water quality standard.

Baseline water quality (BWQ): The ambient condition of the water quality, as of September 30, 2000. Baseline water quality defines the "baseline low-flow pollutant concentration," and in addition, for bioaccumulative toxic pollutants, the baseline load. Baseline water quality is the fully mixed condition below a discharge that was in place prior to September 30, 2000. The derivation and use of BWQ is discussed in detail in Section VI, F and Section VII, questions and answers 9 through 12.

Design Flow (DF): The rated hydraulic discharge capacity of a facility. This value remains constant throughout a permit cycle and is included as a permit limit.

New or increased water quality impact: A new regulated activity or any increase in the authorized discharge levels (load or concentration) over the current authorized discharge levels.

Non-Impact Limit: The limit calculated during the new or increased water quality impacts screening test which would result in no increased water quality impact (no increase in load or limit over the previously authorized load or limit).

Portion of the segment impacted by the discharge: The portion of stream from the discharge point to the first major tributary inflow, or as determined by the Division at the time of the analysis including the determination for waterbodies other than streams.

Significance Determination: A series of four tests which determine if the new or increased water quality impacts will cause significant degradation of a waterbody. If the impact is deemed to result in significant degradation, the antidegradation review must be completed.

Significant Concentration Threshold (SCT): For the concentration test, the significant concentration threshold is the baseline water quality plus 15 percent of the baseline available increment. The SCT is the level (in terms of concentration) that differentiates significant from insignificant degradation.

Threshold Load (TL): For bioaccumulative toxic pollutants, the threshold load is the remaining load after any other discharge loads impacting the portion of the segment are subtracted from 10 percent of the baseline water quality load. The TL is the level (in terms of load) that differentiates significant from insignificant degradation.

Water Quality-Based Effluent Limit (WQBEL): The new potential effluent limits based on the water quality standard where the entire assimilative capacity is taken into account. These limits are developed prior to and without consideration of the antidegradation review process.

B. Applicable Equations

- $$BWQ = \frac{M_{eff}Q_{eff} + M_{u/s}Q_{u/s}}{Q_{eff} + Q_{u/s}}$$
- $$BAI = WQS - BWQ$$
- $$SCT = (0.15 \times BAI) + BWQ$$
- $$Load = Flow \times Concentration$$
- $$Load_{old} = Existing\ Design\ Flow \times Existing\ Limit$$
- $$Load_{new} = New\ Design\ Flow \times WQBEL_{new}$$
- $$BWQ_{load} = Low\ Flow \times BWQ$$
- $$TL = (0.10 \times BWQ_{load}) - other\ discharge\ loads$$

where:

BWQ	=	Baseline water quality concentration
$Q_{u/s}$	=	Upstream chronic low flow (30E3)
Q_{eff}	=	2-year average of 30-day average effluent flow
$M_{u/s}$	=	Upstream background pollutant concentration (85 th %)
M_{eff}	=	2-year average of 30-day average effluent pollutant concentration
BAI	=	Baseline available increment
WQS	=	Water quality standard
SCT	=	Significant concentration threshold
$WQBEL_{new}$	=	Water Quality-Based effluent limit
BWQ_{load}	=	Baseline water quality load
TL	=	Threshold Load

$$\bullet \text{ ADBAC} = M_2 = \frac{M_3 Q_3 - M_1 Q_1}{Q_2}$$

Q_1 = Upstream chronic low flow (30E3)

Q_2 = Average daily effluent flow (design capacity)

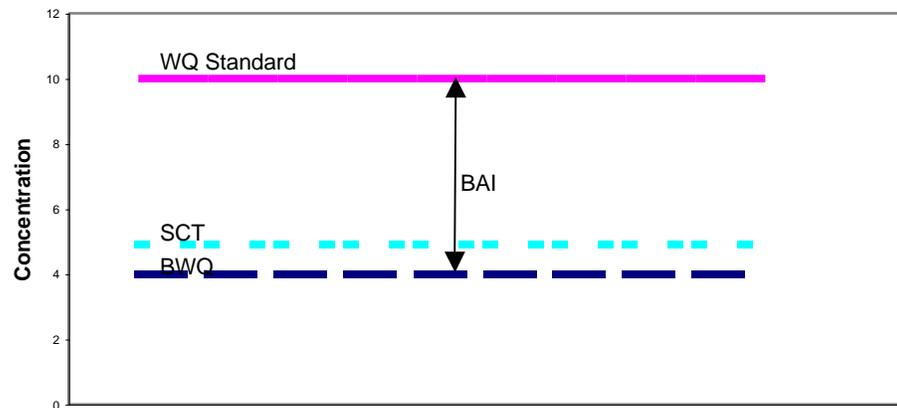
Q_3 = Combined downstream flow ($Q_1 + Q_2$)

M_1 = Instream background pollutant concentration (85th %)

M_2 = Highest average allowable effluent pollutant concentration (ADBAC)

M_3 = Maximum allowable instream pollutant concentration (SCT)

Conceptual Relationship Between Antidegradation Terms



C. Overview of the Antidegradation Review Process

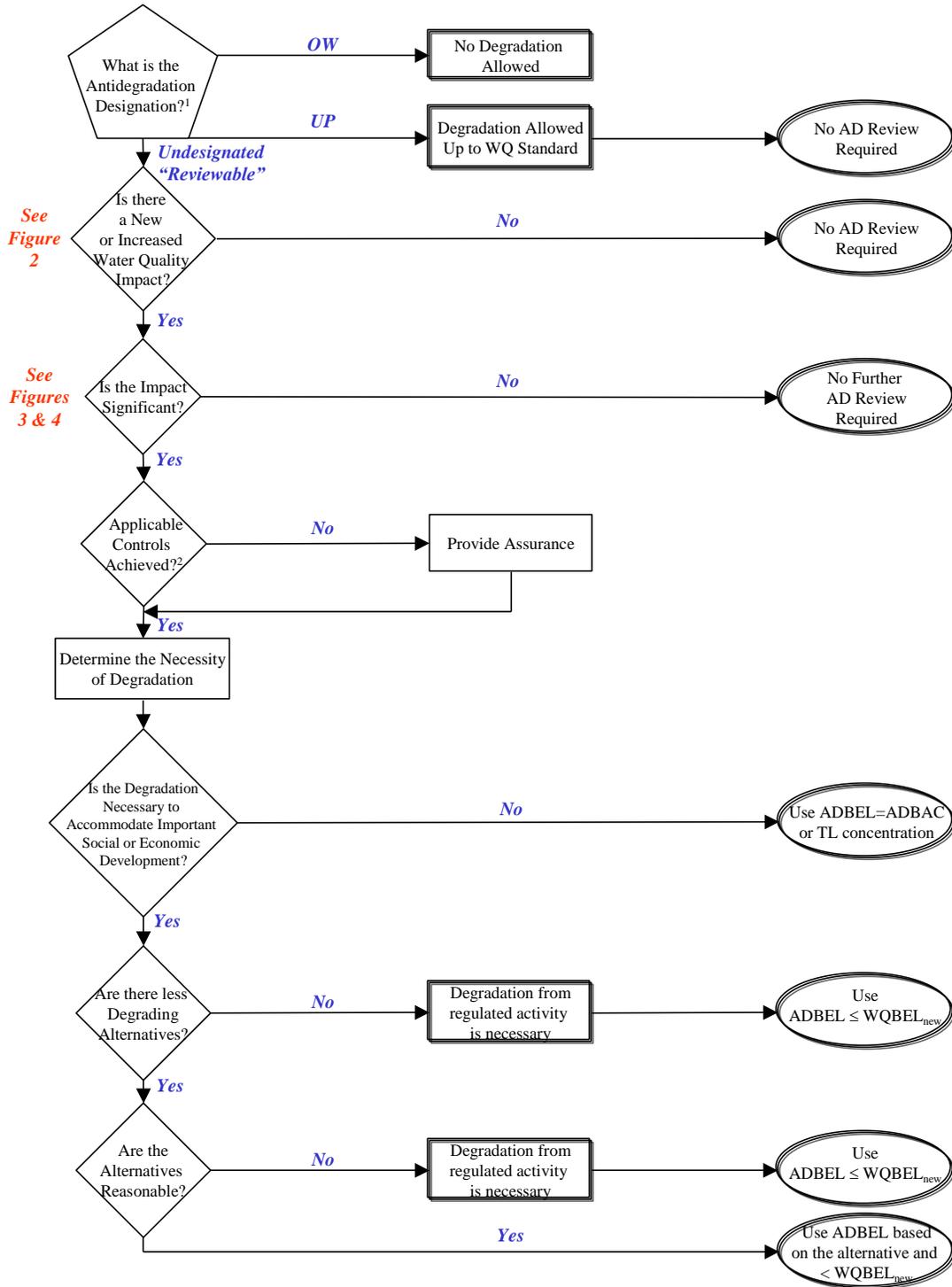
The following schematics detail the antidegradation review process. An overview of the process is provided in Figure 1. The two major steps in the review are elaborated in three separate schematics that follow: Figure 2, Screening Process – Is there a New or Increased Water Quality Impact, and Figures 3 and 4, Is the Impact Significant, for non-bioaccumulative toxic pollutants and bioaccumulative toxic pollutants, respectively. The highlighted ovals note endpoints of the antidegradation process (see also Section VII, question and answer number 38).

The following footnotes apply to Figure 1 on the next page.

¹ Section 31.8(3)(g) states “If, during an antidegradation review, it is determined that an existing use of the affected waterbody has not been classified, prior to completing the antidegradation review for an applicable regulated activity, an expeditious rulemaking hearing shall be held (on an emergency basis if necessary) to consider adoption of the additional classification.”

² Section 31.8(1)(b) states “Further, all applicable statutory and regulatory requirements for point sources and, if applicable control regulations have been adopted, all cost-effective and reasonable best management practices for nonpoint sources shall be met.”

Figure 1. Antidegradation Review Process Overview



D. Application of the New or Increased Water Quality Impact Screening Test for renewal CDPS Permits.

For a reviewable water there must first be a determination of whether there is a new or increased water quality impact. For renewal permits, if there is an increased water quality impact then an antidegradation review is required and a significance determination must be completed. The following steps explain the screening process for a renewal of a CDPS permit (see Figure 2, page 16).

1. Calculate the potential new discharge load [$Load_{new}$] by using the new water quality-based effluent limit [$WQBEL_{new}$] and the new Design Flow.
2. Calculate the current authorized discharge load [$Load_{old}$] by using the current authorized discharge concentration [Existing Limit] and the existing Design Flow.
3. Compare the current authorized discharge load [$Load_{old}$] with the potential new discharge load [$Load_{new}$].
 - 3a. If the $Load_{new}$ **is greater** than the $Load_{old}$, then proceed to Step 4.
 - 3b. If the $Load_{new}$ **is not greater** than the $Load_{old}$, then proceed to Step 5.
4. Divide the current authorized discharge load [$Load_{old}$] by the new Design Flow. Compare the result of dividing the $Load_{old}$ by the new Design Flow with the current authorized discharge concentration [Existing Limit].
 - 4a. If the result of dividing the $Load_{old}$ by the new Design Flow **is greater** than the Existing Limit, then the permittee could **choose to retain** their Existing Limit (this condition will only occur if the new design flow is lower than the existing design flow). Retaining their Existing Limit will not result in an increased water quality impact and an antidegradation review will not be required. The Existing Limit would then move forward in the permits process as a potential limit without an antidegradation-based limit. If the permittee **chooses not to retain** their Existing Limit, then there will be an increased water quality impact and the significance tests must be conducted.
 - 4b. If the result of dividing the $Load_{old}$ by the new Design Flow **is not greater** than the Existing Limit, then the Non-Impact Limit is established as the result of dividing the $Load_{old}$ by the new Design Flow. The permittee could **choose to accept** the Non-Impact

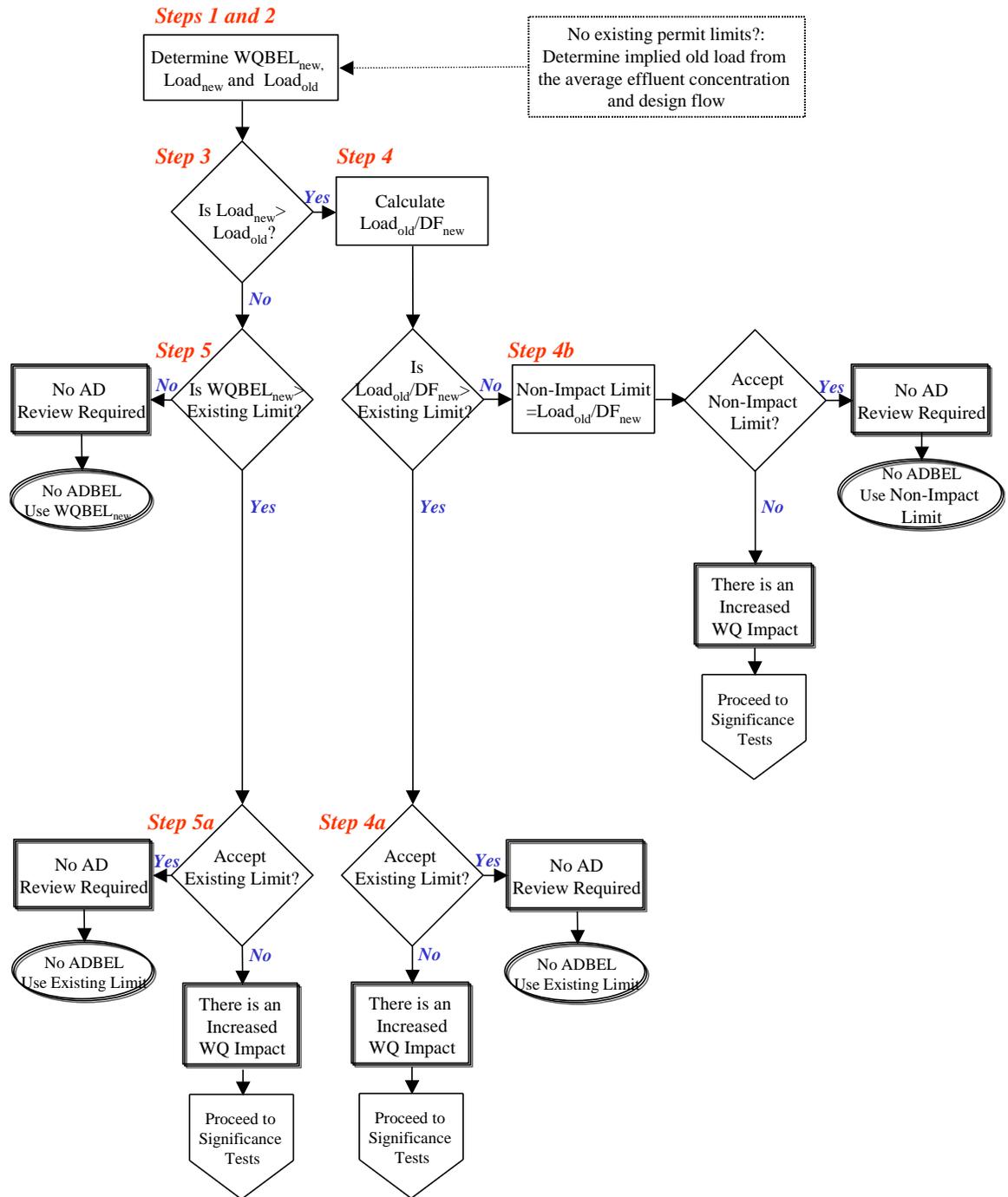
Limit (see Section VII, question and answer 37). Acceptance of the Non-Impact Limit would not result in an increased water quality impact and an antidegradation review would not be required. The Non-Impact Limit would then move forward in the permits process as a potential limit without an antidegradation-based limit. If the permittee **chooses not to accept** the Non-Impact Limit, then there will be an increased water quality impact and the significance tests must be conducted.

5. Compare the current authorized discharge concentration [Existing Limit] with the potential new discharge concentration [WQBEL_{new}].
 - 5a. If the WQBEL_{new} **is greater than** the Existing Limit, then the permittee could **choose to retain** their Existing Limit. In this case, retaining their Existing Limit in the next permit cycle would not result in an increased water quality impact and the significance tests would be unnecessary. The Existing Limit would then move forward in the permits process as a potential limit without an antidegradation-based limit. If the permittee **chooses not to retain** their Existing Limit, then an increased water quality impact will occur and the significance tests are necessary. The significance tests are outlined in Section VI, E, F and G.
 - 5b. If the WQBEL_{new} **is not greater than** the Existing Limit, then an increased water quality impact will not occur and the significance tests are unnecessary.

The new Design Flow also always moves forward through the permits process.

The authorized discharge concentration is the effluent concentration explicitly described in the permit, otherwise known as the permit limit. Many permits do not include limits for all pollutants. For those pollutants known to be in a discharge yet not explicitly limited in the permit (due to a Reasonable Potential Analysis, etc.), the Division will recognize an implicit allocation or limit. The average effluent concentration will be used to determine an implicitly authorized discharge concentration. An implicitly authorized discharge load will then be determined by using the implicitly authorized discharge concentration and the existing design flow. If effluent concentration data is not available, then data may be gathered by the permittee in order to make an allocation determination. For those pollutants undisclosed by the permittee and unknown by the Division to be present in the discharge, an implicit allocation or limit may not be recognized. This will be determined on a case-by-case basis. For those pollutants recognized by the Division with an implicit allocation, the same steps 1 through 5 above can be followed. The authorized discharge concentration and load would then be replaced with the implicitly authorized discharge concentration and load.

Figure 2. Screening Process – Is there a New or Increased WQ Impact?



E. Antidegradation Significance Determination Tests (section 31.8(3)(c)):

Once the determination of an increased water quality impact has been made, the significance tests must be applied and antidegradation-based effluent limits must be calculated. The four significance determination tests are listed below. The first test, the Bioaccumulative Toxic Pollutant Test only applies to bioaccumulative toxic pollutants. All pollutants must be reviewed with the other three tests.

The following schematics illustrate the significance determination tests for non-bioaccumulative toxic pollutants (Figure 3, page 20) and for bioaccumulative toxic pollutants (Figure 4, page 24).

1. Bioaccumulative Toxic Pollutant Test (31.8(3)(c)(i))

The test based on “10 percent of the existing load” applies specifically to bioaccumulative toxic pollutants. For bioaccumulative toxic pollutants, an activity can be deemed insignificant if the new or increased load from the activity is less than 10 percent of the existing baseline total load. Bioaccumulative toxic pollutants are defined in Regulation No.31 at section 31.8(3)(c)(i) as those chemicals with a bioaccumulation factor (“BAF”) equal to or greater than 1000. The following is a list of such pollutants that was compiled by the EPA Great Lakes Initiative. The pollutant’s name is followed by its CAS Number (Chemical Abstracts Service Registry Number). Other chemicals would also be considered bioaccumulative toxic pollutants if their BAF was equal to or greater than 1000.

Bioaccumulative Toxic Pollutants

Chlordane 57-74-9	Lindane 58-89-9
DDD 72-54-8	Mercury 7439-97-6
DDE 72-55-9	Mirex 2385-85-5
DDT 50-29-3	*Octachlorostyrene 29082-74-4
Dieldrin 60-57-1	PCBs 1336-36-3
Hexachlorobenzene 118-74-1	Pentachlorobenzene 608-93-5
Hexachlorobutadiene 87-68-3	*Photomirex 39801-14-4
Hexachlorocyclohexane (alpha-) 319-84-6	TCDD (2,3,7,8-) 1746-01-6
Hexachlorocyclohexane (BHC) 608-73-1	*Tetrachlorobenzene (1,2,3,4-) 634-66-2
Hexachlorocyclohexane (beta-) 319-85-7	Tetrachlorobenzene (1,2,4,5-) 95-94-3
*Hexachlorocyclohexane (delta-) 319-86-8	Toxaphene 8001-14-4

* These pollutants do not have adopted surface water standards in the State of Colorado as of the publication date of this guidance document.

2. Temporary Impacts Test (31.8(3)(c)(ii)(C))

Regulated activities that result in only temporary or short-term changes in water quality will be determined to be insignificant; so long as the long-term operation of the activity will not result in an adverse change in water quality.

3. Dilution Test (31.8(3)(c)(ii)(A))

A new or increased discharge diluted by 100 to 1 or more at critical flow (low flow) conditions is determined to be insignificant.

4. Concentration Test (31.8(3)(c)(ii)(B))

The concentration-based “15 percent of the available increment” test is to consider the cumulative impact of discharges over a baseline condition. In order to be “insignificant”, the new or increased discharge may not increase the actual instream concentration by more than 15 percent of the available increment over the baseline. The baseline condition is set at September 30, 2000.

In addition, it may be determined that a water quality impact provides net environmental benefits (Regulation No. 31 at section 31.8(3)(c)). The regulation states:

This significance determination shall be made with respect to the net effect of the new or increased water quality impacts of the proposed regulated activity, taking into account any environmental benefits resulting from the regulated activity and any water quality enhancement or mitigating measures impacting the segment or segments under review, if such measures are incorporated with the proposed regulated activity.

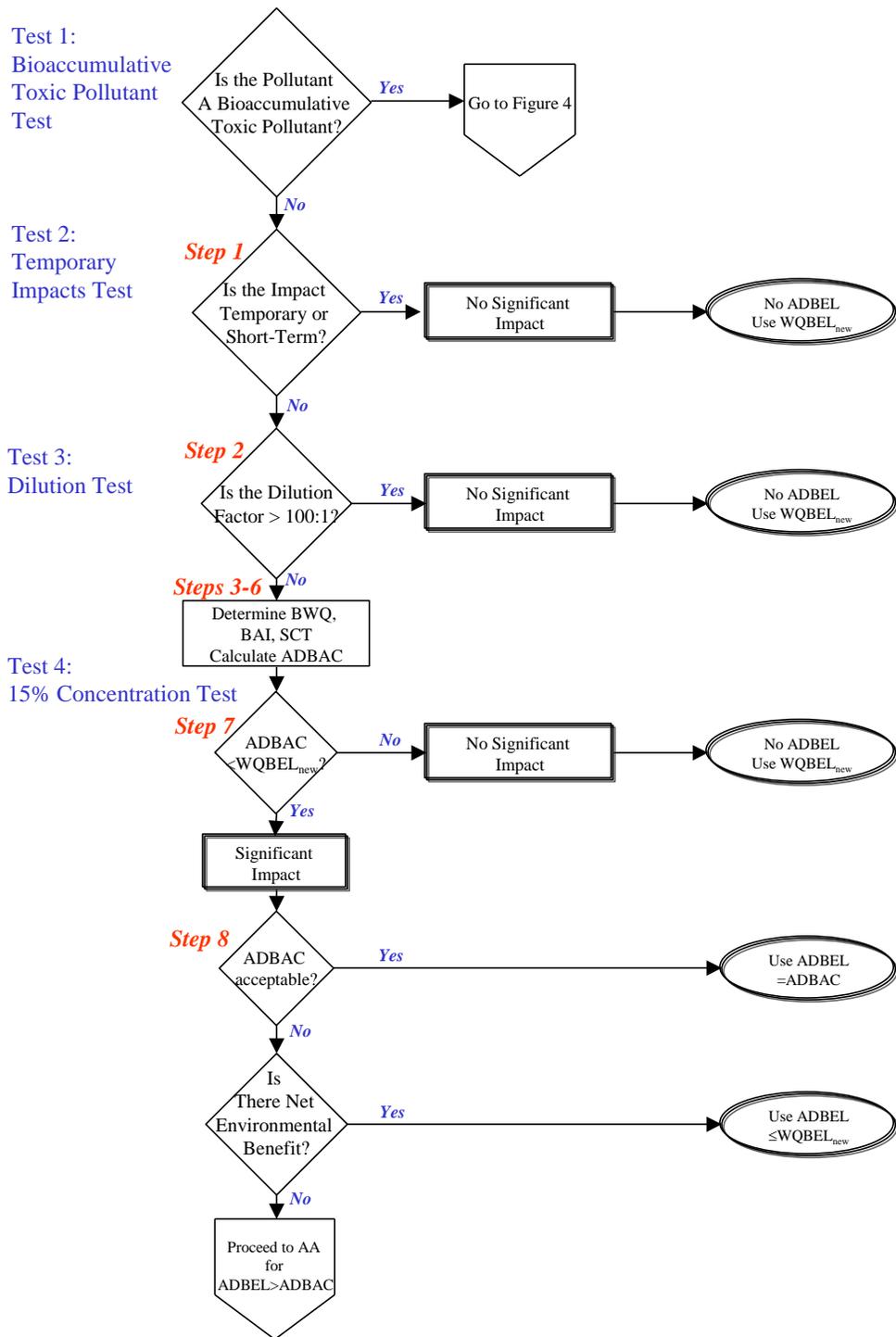
F. Non-Bioaccumulative Toxic Pollutants: Application of Significance Tests and Calculation of Antidegradation-Based Effluent Limits for Renewal CDPS Permits.

Once the determination of an increased water quality impact has been made, the significance tests must be applied and antidegradation-based limits must be calculated. Regardless of the determination of significance, the permits process will always proceed with potential WQBELs. Antidegradation-based effluent limits (ADBELs) will only be applied in addition to WQBELs if a determination of significant degradation has been made. The potential WQBELs would be for chronic (30-day) and acute (1-day) conditions implemented as a 30-day average and daily maximum, respectively. The ADBELs would be implemented as a 24-month moving average. **In no case may an ADBEL be greater than a WQBEL.** The following steps outline these processes for non-bioaccumulative

toxic pollutants for renewal CDPS permits (see Figure 3, page 20). These steps must be followed using the new WQBEL and new Design Flow.

1. Determine if the discharge will result in only temporary or short-term changes in water quality. If so, there is no significant degradation. If not, proceed with Step 2.
2. Determine whether the ratio of chronic low flow of the receiving water to the new Design Flow of the discharge is **greater** than 100 to 1. If so, there is no significant degradation. If the ratio is **not greater** than 100 to 1, proceed with the following steps.
3. Determine the baseline water quality concentration (BWQ). Look up BWQ, or if not yet established, then establish the BWQ.
4. Establish the baseline available increment (BAI, standard minus BWQ).
5. Establish the significant concentration threshold (SCT, [0.15 times the BAI] plus BWQ). If there are no other discharges impacting the portion of the segment then proceed to Step 6. If there are other discharges, then evaluate if the SCT has already been allocated (See Sections IV,E and VII, question and answer number 19).
6. Re-calculate the mass balance equation using the SCT (in place of the standard) to determine the antidegradation-based average concentration (ADBAC).
7. Compare the antidegradation-based average concentration [ADBAC] with the potential new discharge concentration [WQBEL_{new}].
 - 7a. If the ADBAC is **less** than the WQBEL_{new} then the WQBEL_{new} is found to result in significant degradation; proceed to Step 8.
 - 7b. If the ADBAC is **not less** than the WQBEL_{new} then the WQBEL_{new} is found to result in insignificant degradation.
8. The permittee may **elect to accept** the ADBAC (which would result in insignificant degradation) along with the WQBEL_{new}, or may pursue less stringent limits by completing the antidegradation review including alternatives analysis. If the discharger **elects to accept** the ADBAC, then the permits process would proceed with potential WQBELs for chronic (30-day) and acute (1-day) conditions implemented as a 30-day average and daily maximum, respectively; as well as an antidegradation-based limit set at the ADBAC and implemented as a 24-month moving average.

Figure 3. Non-Bioaccumulative Toxic Pollutants - Is the Impact Significant?



G. Bioaccumulative Toxic Pollutants: Application of Significance Tests and Calculation of Antidegradation-Based Effluent Limits for Renewal CDPS Permits.

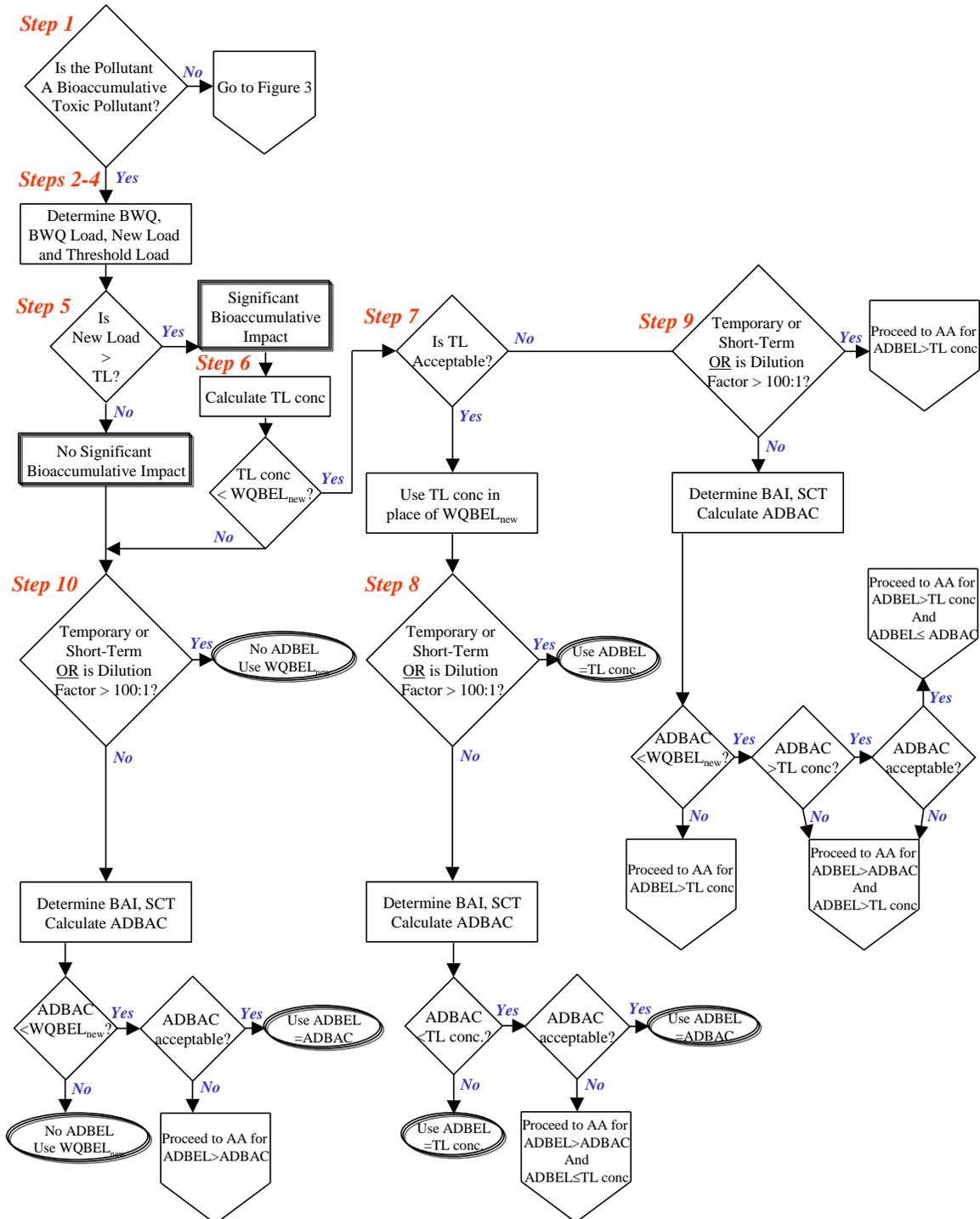
Once the determination of an increased water quality impact has been made, the significance tests must be applied and antidegradation-based limits must be calculated. As discussed above in Section VI, F, regardless of the determination of significance, the permits process will always proceed with potential WQBELs. ADBELs will only be applied in addition to WQBELs if a determination of significant degradation has been made. The potential WQBELs would be for chronic (30-day) and acute (1-day) conditions implemented as a 30-day average and daily maximum, respectively. The ADBELs would be implemented as a 24-month moving average. **In no case may an ADBEL be greater than a WQBEL.** The following steps outline these processes for bioaccumulative toxic pollutants for renewal CDPS permits (see Figure 4, page 24). These processes are discussed separately for bioaccumulative toxic pollutants since these pollutants are subject to all four tests and two different significance levels may result (ADBAC and/or TL). These steps must be followed with the new WQBEL and new Design Flow.

1. Determine if the pollutant is a bioaccumulative toxic pollutant. If so, then proceed with the following steps. If not, then follow the steps for non-bioaccumulative toxic pollutants outlined under Section VI, F above.
2. Determine the baseline water quality load ($BWQ_{load} = BWQ \text{ times low flow}$). Look up BWQ and BWQ_{load} , or if not yet established then establish BWQ and BWQ_{load} .
3. Establish the new load ($WQBEL_{new} \text{ times new Design Flow}$).
4. Establish the threshold load ($TL = 0.1 \text{ times } BWQ_{load} - \text{ other discharge loads}$).
5. Compare the new load with the threshold load.
 - 5a. If the new load **is greater than** the TL, then the new load is found to result in significant degradation for the 10% bioaccumulative test. Proceed to Step 6.
 - 5b. If the new load **is not greater than** the TL, then the new load is found to result in insignificant degradation for the 10% bioaccumulative test. Proceed to Step 10.

6. Calculate the concentration associated with the threshold load. Divide the TL by the new Design Flow to result in a value for the TL concentration. Compare the TL concentration with the $WQBEL_{new}$.
 - 6a. If the TL concentration **is less than** the $WQBEL_{new}$, then proceed to Step 7 with the TL including the TL concentration and new Design Flow.
 - 6b. If the TL concentration **is not less than** the $WQBEL_{new}$, then proceed to Step 10 with the new load including the $WQBEL_{new}$ and new Design Flow.
7. The permittee may **elect to accept** the TL (which would result in insignificant degradation for the 10% bioaccumulative test). Acceptance of the TL would then require the other three significance determination tests to be followed with the TL levels (TL concentration and new Design Flow) instead of the new load levels ($WQBEL_{new}$ and new Design Flow); proceed to Step 8. If the permittee **chooses not to accept** the TL, then the permittee may pursue less stringent limits by completing the antidegradation review including alternatives analysis. The other three tests must still be followed with the new load levels; proceed to Step 9.
8. Conduct other three tests using **TL levels (TL concentration and new Design Flow)**.
 - 8a. If the **TL concentration** was found to result in **insignificant** degradation for the other three tests, the antidegradation review would end and the permits process would proceed with a potential $WQBEL$ as well as an $ADBEL$ set at the concentration associated with the TL.
 - 8b. If the **TL concentration** was found to result in **significant** degradation for the other three tests, then the permittee could **elect to accept** the $ADBAC$ (which would result in insignificant degradation for all four tests) along with the $WQBEL$ or may pursue less stringent limits by completing the antidegradation review including alternatives analysis. If the permittee elects to accept the $ADBAC$, the antidegradation review would end and the permits process would proceed with potential $WQBELs$ as well as an $ADBEL$ set at the $ADBAC$. If the permittee **rejects** the $ADBAC$, then the antidegradation review would continue and an alternatives analysis must be completed with a justification for limits higher than the $ADBAC$ and/or TL.

9. Conduct other three tests using **new load levels (WQBEL_{new} and new Design Flow)**.
 - 9a. If the **WQBEL_{new}** was found to result in **insignificant** degradation for the other three tests, then the antidegradation review would continue and an alternatives analysis must be completed resulting in a justification for limits higher than the TL. The permits process would then proceed with a potential WQBEL as well as an ADBEL developed as a result of the alternatives analysis.
 - 9b. If the **WQBEL_{new}** was found to result in **significant** degradation for the other three tests, then so long as the ADBAC is greater than the TL concentration, the permittee could **elect to accept** the ADBAC (which would result in insignificant degradation for the concentration test) along with the WQBEL or may pursue less stringent limits (for the concentration test and bioaccumulative test) by completing the antidegradation review including alternatives analysis. If the permittee elects to accept the ADBAC, then the antidegradation review would continue and an alternatives analysis must be completed to justify limits higher than the concentration associated with the TL (but not higher than the ADBAC). If the permittee **rejects** the ADBAC, then the antidegradation review must be completed including an alternatives analysis with a justification for limits higher than the ADBAC and TL.
10. The other three significance determination tests must then be followed with the new load (WQBEL_{new} and new Design Flow, see Section VI, F above). In this scenario, the other three tests would be followed in the same manner as a non-bioaccumulative toxic pollutant with the same endpoints.

Figure 4. Bioaccumulative Toxic Pollutants - Is the Impact Significant?



VII. QUESTIONS AND ANSWERS**Q1: Which waters are reviewable?**

A1: Segments without a designation of Outstanding Waters (OW) or Use-Protected (UP) are subject to antidegradation reviews.

Q2: How do you determine if there is a new or increased water quality impact?

A2: Any new load is considered a new water quality impact. An increased water quality impact is determined as follows: If the potential new discharge load is greater than the current authorized discharge load, or if the new water quality-based effluent limit is greater than the current authorized limit then there is an increased water quality impact. The potential new discharge load is calculated by multiplying the new water quality-based effluent limit by the new design flow of the facility. The current discharge load is calculated by multiplying the current authorized effluent concentration by the current design flow. If the new load is not greater than the current load but the new water quality-based effluent limit is greater than the existing limit then the permittee may choose to retain their existing limit which would not result in an increased water quality impact. See Figure 2 and the associated text in Section VI, D for more information. See also Q&A number 37.

Q3: How do you determine if the impact is significant?

A3: There are four significance tests. The first test applies only to bioaccumulative toxic pollutants. The remaining three tests apply to all pollutants and include 2) 100:1 dilution factor, 3) concentration test and 4) temporary or short-term test. The majority of the Antidegradation Significance Determination Guidance focuses on the concentration test. The application of these tests is described in multiple Q&As below. The significance determination applies to adopted narrative and numeric standards. The results of the significance determination tests are to be documented on the Antidegradation Significance Determination Worksheet which is attached to this guidance document.

Q4: How do you apply the temporary or short-term impacts test?

A4: Generally, the temporary or short-term impacts test applies directly to 401 Certifications. CDPS permits are generally issued for a period of 5 years; therefore, the permitted “impact” could not be considered short-term or temporary. An exception to this would be a CDPS permit issued for a non-discharging facility which in the event of an extremely high stormwater event may discharge temporarily.

Q5: How do you apply the 100:1 dilution test?

A5: If the ratio of chronic low flow to design flow is greater than 100:1 then the discharge is considered to not result in significant degradation. The antidegradation review would then be complete and antidegradation-based limits would not be calculated. If there are only acute limits then use the acute low flow (see Regulation No.31 at section 31.8(3)(c)).

Q6: How do you apply the 15% concentration test?

A6: The 15% concentration test is measured against the baseline water quality condition. Essentially, 15% of the difference between the baseline water quality and the water quality standard is the limited amount of degradation allowed to a waterbody for the impact to be considered insignificant. The following terms are used in calculating this significance level and are explained further in Q&As below: baseline water quality (BWQ), baseline available increment (BAI), significant concentration threshold (SCT), antidegradation-based average concentration (ADBAC) and water quality-based effluent limit (WQBEL). The end product of the 15% concentration test is the discharged concentration level that would be considered to result in insignificant impacts. This level is usually the ADBAC.

Q7: What if the significance tests result in a finding of significant degradation?

A7: Then the permittee could choose to accept the discharge levels deemed to result in insignificant degradation (based on the ADBAC and/or TL) or the antidegradation review continues including an evaluation by the permittee of the project alternatives. Q&A number 40 contains further guidance on the alternatives analysis.

Q8: How is the water quality-based effluent limit determined?

A8: The water quality-based effluent limit (WQBEL) is determined by a mass balance calculation (or modeling for ammonia). The mass balance calculation is performed during the assessment of assimilative capacity to determine potential permit limits prior to any evaluations for an antidegradation review. The Division's Waste Load Allocation and TMDL Guidance (WQCD 1991) contains additional information on this calculation.

Q9: How is the baseline water quality (BWQ) determined if a discharge wasn't in place prior to September 30, 2000?

A9: Baseline water quality is determined by a characterization of ambient water quality as of September 30, 2000. Characterization of ambient water quality data is usually based on the 85th percentile of representative data. In general, ambient data should be no older than five years. Older data may be used on a case-by-case basis, if such data is representative of baseline conditions on September 30, 2000. In cases where significant changes have occurred in the watershed within the last five years, it may be appropriate to use a shorter period of record. If a large data set is available, then the ideal period of record is from 1995-2000.

Q10: How is the BWQ determined if a discharge was in place prior to September 30, 2000?

A10: To determine the baseline water quality, obtain data from a water quality station located below a fully mixed condition downstream of the segment portion in question. The ambient water quality data is calculated as the 85th percentile of representative data. In general, ambient data should be no older than five years. Older data may be used on a case-by-case basis, if such data is representative of baseline conditions on September 30, 2000. In cases where significant changes have occurred in the watershed within the last five years, it may be appropriate to use a shorter period of record. If a large data set is available, then the ideal period of record is from 1995-2000.

Q11: How is the BWQ calculated if a discharge was in place prior to September 30, 2000, where representative downstream data isn't available?

A11: If representative downstream data is not available, use representative upstream station and discharge data to calculate instream water quality at a fully mixed condition below the discharge. The 85th percentile ambient upstream concentration and the receiving water chronic (30E3) low flow should be combined with the characteristic discharge condition defined as mean 30-day average effluent concentration and flow. The period of record for ambient data should generally be the previous five years (see Q&A number 9). The period of record for discharge data, should generally be the previous two years (as reported on the discharge monitoring reports) prior to September 30, 2000. In cases where significant changes have occurred at the plant, it may be appropriate to use a different period of record. If a large data set is available, then the ideal period of record for ambient data is from 1995-2000; and for discharge data is from 1998-2000. The equation is provided below:

$$BWQ = \frac{M_{eff}Q_{eff} + M_{u/s}Q_{u/s}}{Q_{eff} + Q_{u/s}}$$

where:

BWQ	=	Baseline water quality concentration
$Q_{u/s}$	=	Upstream chronic low flow (30E3)
Q_{eff}	=	Long-term average effluent flow
$M_{u/s}$	=	Upstream background pollutant concentration (85 th %)
M_{eff}	=	Long-term average effluent pollutant concentration

Q12: How is the BWQ determined if there is no data available for the waterbody or the discharge?

A12: Representative data from a comparable watershed may be used at the Division's discretion. If there is no representative data available, then provisions may be granted to obtain data to represent ambient water quality conditions as of September 30, 2000.

If calculating the BWQ, representative data from a comparable facility may be used at the Division's discretion. If there is no representative data available from a comparable facility, then provisions may be granted to obtain data to represent the average effluent contribution to water quality conditions as of September 30, 2000.

Q13: How is the baseline available increment determined?

A13: Determine the chronic water quality standard. Subtract the baseline water quality concentration from the standard to obtain the baseline available increment (BAI). The equation is provided below:

$$BAI = WQS - BWQ$$

where:

BAI	=	Baseline available increment
WQS	=	Water quality standard
BWQ	=	Baseline water quality concentration

If there is only an acute standard then use the acute standard and low flow in the calculations.

Q14: How is the significant concentration threshold level established?

A14: Calculate 15% of the baseline available increment. Add this value to the baseline water quality concentration to determine the significant concentration threshold (SCT). The equation is provided below:

$$SCT = (0.15 \times BAI) + BWQ$$

where:

- SCT* = Significant concentration threshold
BAI = Baseline available increment
BWQ = Baseline water quality concentration

Q15: How is the antidegradation-based average concentration (ADBAC) determined?

A15: The ADBAC is the highest average effluent discharge level that would result in insignificant degradation. The ADBAC is determined by re-calculating the mass balance equation (or modeling for ammonia) using the significant concentration threshold in place of the water quality standard. The equation is provided below:

$$M_2 = \frac{M_3Q_3 - M_1Q_1}{Q_2}$$

Q_1 = Upstream low flow (30E3)

Q_2 = Average daily effluent flow (design capacity)

Q_3 = Combined downstream flow ($Q_1 + Q_2$)

M_1 = Instream background pollutant concentration

M_2 = Highest average allowable effluent pollutant concentration (ADBAC)

M_3 = Maximum allowable instream pollutant concentration (SCT)

The ADBAC is calculated in the above equation as M_2 for chronic conditions. If the pollutant only has an acute standard, then the acute standard is used to generate the SCT and the acute low flow (1E3) is substituted for Q_1 . The instream background pollutant concentration (M_1) is calculated as the 85th percentile ambient upstream concentration from the previous five years of data.

Q16: How is Ammonia evaluated during the significance determination?

A16: The process for determining the BWQ, BAI, SCT and ADBAC for ammonia is similar to the other pollutants although the tools are different. Currently, WQBELs are calculated for all pollutants based on mass balance calculations except for ammonia. The Colorado Ammonia Model (CAM) is used to determine the assimilative capacity of streams for ammonia. The monthly ammonia WQBELs are determined through execution of the model.

The model is adjusted to determine the monthly ADBACs. The BWQ is determined by entering the mean monthly discharge concentrations of total ammonia and the mean monthly discharge flows into the model. The monthly BWQ of unionized ammonia for the affected segment can be obtained from the

model (highest unionized ammonia value for mixed conditions on Chronicmod worksheet). The BAI and SCT are calculated as for other pollutants. The SCT is then entered into the model in place of the standard and the resulting ADBACs are determined. As a default, the lowest monthly ADBAC value will be set as the 24-month moving average ADBEL. An optional approach to using the lowest monthly ADBAC to set the ADBEL is to combine the monthly ADBACs into three representative groups; with the average of each group's ADBACs used to set three separate ADBELs. In this optional approach, the three groups will be defined by similar ADBAC values, and the months in each group do not need to be consecutive. The three representative groups might be related to seasonal variations in stream flow, stream chemistry, or discharge chemistry. The three ADBELs will be implemented as moving averages for those grouped months over two periods of data (with a period representing a reporting year).

Q17: What limit goes in my permit?

A17: The process of developing permit limits is a complicated one. There are many evaluations as part of the permit drafting process including reasonable potential, antibacksliding, new water quality-based effluent limits (WQBELs) and technology-based effluent limits. Antidegradation is but one more evaluation in the permits process for regulated activities resulting in a new or increased water quality impact to a reviewable water. If the new or increased water quality impact is determined to result in significant degradation, then an antidegradation-based effluent limit (ADBEL) is needed. Potential limits determined through the antidegradation review that would proceed through the remainder of the permits process would vary depending on the outcome of the following different scenarios: 1) If, as part of the screening test for new or increased water quality impacts, a permittee chooses to retain their existing limit or load then an ADBEL would not be needed and the potential limits in the permit would be the existing limits or Non-Impact Limit. 2) If a new or increased water quality impact will occur, but the significance tests result in a finding of no significant degradation, then potential limits in the permit would be the new WQBEL with no ADBEL. 3) If the new or increased water quality impact is determined to result in significant degradation and the permittee chooses to accept the levels that would keep them insignificant, such as the ADBAC or the TL then potential permit limits would be the new WQBEL and the ADBEL set at the ADBAC or TL concentration. 4) If the new or increased water quality impact is determined to result in significant degradation and the permittee chooses not to accept the levels that would keep them insignificant, then the permittee would pursue the alternatives analysis for an ADBEL other than the ADBAC or TL; and the potential permit limits would be the WQBEL and the ADBEL set at some other value resulting from the alternatives analysis. All the ADBELs would be implemented as a 24-month moving average along with WQBELs for chronic (30-day) and acute (1-day) conditions implemented as a 30-day average and daily maximum, respectively. The WQBEL may not actually be the value set as the limit in the final permit due

to the other evaluations during the process as mentioned above. In addition to concentration limits, the new Design Flow would also be a limited value in the permit. Please see your permit drafter for a more detailed explanation of the permits process and associated evaluations other than antidegradation.

Q18: What if my facility has a previously authorized allocation and my processes aren't changing?

A18: If the permittee had previously been allocated a waste load, and the new WQBEL or load is greater than the current effluent limit or load, then for the current renewal, the permittee may elect to retain their existing limit and waste load allocation. Retention of the existing limit and load under these circumstances results in no increased water quality impact; therefore, an antidegradation review is not required (see Figure 2, page 16; and Q&A number 3). Should the facility choose to increase their load and/or their effluent concentration, then an increased water quality impact will occur and significance determination is required (option to retain existing permit limit is not available).

This policy essentially grandfathers existing plants with their existing limits as of September 30, 2000 so long as those limits are protective (i.e. the new WQBELs are greater than or equal to the existing limits). The permittee may choose not to retain their existing limit and load and may proceed to the antidegradation review. In addition, during any antidegradation review, the permittee may elect to reject the antidegradation-based average concentration and may pursue the remainder of the review including the alternatives analysis.

Q19: What if a new discharge is proposed on a reviewable waterbody where the SCT has been allocated?

A19: The new permittee could elect to accept "end of pipe" effluent limits equal to the SCT, negotiate waste load allocations with adjacent dischargers, propose a control regulation to the Commission where the load could be re-allocated to all the discharges on the portion of the segment, or pursue continuing the antidegradation review including alternatives analysis.

Q20: What if my facility has extensive site-specific data or a situation that doesn't match this guidance?

A20: This guidance document is just that, "guidance", for implementing the antidegradation regulations. It is designed as a framework to provide a documented methodology and to ensure consistency among permits and those conducting the antidegradation reviews. Special situations will be assessed on a

case-by-case basis; and will be adequately documented as an attachment to this guidance.

Q21: How are BWQs and ADBACs established for the new E. Coli standard?

A21: The BWQ and ADBAC are established in the same way as for all other existing or new standards. The BWQ is determined by downstream ambient water quality data or is calculated with effluent data. In the absence of ambient E.Coli data ($M_{u/s}$), data from a comparable watershed is used.

Q22: What happens if the calculated BWQ exceeds the water quality standard?

A22: If the calculated BWQ exceeds the water quality standard, there is no baseline available increment to be protected. In this case, the ADBAC cannot be calculated. Antidegradation-based limits would not apply since the water quality is already degraded. The Division will then further evaluate the waterbody for 303(d) Listing.

Q23: What happens if our facility has a new discharge after September 30, 2000?

A23: ADBACs will be calculated with BWQ established without the presence of a discharge on September 30, 2000 (see Q&A number 9).

Q24: When low flows of zero are encountered, do the antidegradation calculations still apply?

A24: Yes. Take for example, a facility that was not in existence as of September 30, 2000, that is now discharging to a receiving stream with a low flow during part of the year of zero. The BWQ would be calculated using the 85th percentile of the available data (from periods when there is water in the stream). The SCT would be calculated as the BWQ plus 15 percent of the baseline available increment. The SCT would then be used to calculate the ADBAC.

Q25: What happens if a discharge was in place before September 30, 2000 but was not permitted?

A25: ADBACs will be calculated with BWQ established using the upstream ambient water quality. The Division may grant exceptions to this on a case-by-case basis for certain historic discharges like draining mine adits.

Q26: What if my permitted facility is discharging a new pollutant since September 30, 2000?

A26: The new pollutant was not in place as of September 30, 2000 and had not had a previously authorized waste load allocation; therefore, ADBACs will be calculated with BWQ established without the presence of a discharge on September 30, 2000 (see Q&A number 9).

Q27: What if my permitted facility is discharging a pollutant that wasn't previously limited?

A27: For those pollutants known to be in a discharge yet not explicitly limited in the permit (due to a Reasonable Potential Analysis, etc.), the Division will recognize an implicit allocation or limit. If the new WQBEL or load is greater than the current effluent levels or load, then for the current renewal, the permittee may elect to retain their implicit waste load allocation. Retention of the existing limit and load under these circumstances results in no increased water quality impact; therefore an antidegradation review is not required (see Q&A number 3). Should the facility choose to increase their load and/or their effluent concentration, then an increased water quality impact will occur and significance determination is required.

This policy essentially grandfathers existing plants with their existing levels as of September 30, 2000 so long as those levels are protective (i.e. the new WQBELs are greater than or equal to the existing levels). The permittee may choose not to retain their existing implicit waste load allocation and may proceed to the remainder of the antidegradation review. In addition, during any antidegradation review, the permittee may elect to not accept the antidegradation-based average concentration and may pursue the remainder of the review including the alternatives analysis.

The implied waste load allocation will be estimated by multiplying the mean effluent concentration from the facility (over a two-year period of record) by the design flow of the facility.

In calculating the BWQ, pollutants discharged prior to September 30, 2000 are included. Pollutant concentrations (M_{eff}) will be estimated using mean effluent monitoring data from the facility or a comparable facility.

If effluent concentration data is not available, then data may be gathered by the permittee in order to make an allocation determination. For those pollutants undisclosed by the permittee and unknown by the Division to be present in the discharge, an implicit allocation or limit may not be recognized. This will be determined on a case-by-case basis.

Q28: How is the chronic low flow (30E3) calculated?

A28: There are several methods used by the Division to calculate low flows. These are described in the Division's TMDL and Waste Load Allocation Guidance (WQCD 1991).

Q29: How is the BWQ determined after the permit comes up for review for the second time after these new regulations became effective?

A29: The BWQ is determined one time only. The BWQ is set at September 30, 2000 and does not change between permit cycles. Other factors may change relating to the facility and therefore the permit limits may change but not the BWQ.

Q30: What are my options if flows in the receiving stream vary significantly over the year?

A30: Water quality-based effluent limits are frequently established on a seasonal or monthly basis. The ADBEL is implemented in permits as a two-year moving average; therefore, seasonal or monthly limits are not an option.

Q31: How do you assess the BWQ if a disproportionate amount of the available monitoring data was collected during low flow conditions?

A31: Since the objective is to set the BWQ to reflect low flow concentrations, an appropriate alternative to the 85th percentile method would be to use a central tendency (e.g., the 50th percentile) of just the water quality data that was collected during low flow conditions. Since concentrations generally have an inverse relationship to flow (lower flows have higher concentration), the 85th percentile is more representative of lower flow conditions. In cases where this dilution relationship does not exist it may be appropriate to use some other method to characterize the low flow concentration. Such decisions will be made on a case-by-case basis.

Q32: Is the 85th percentile the appropriate statistic to use to characterize every pollutant?

A32: No. The Division uses the term "85th percentile" to broadly refer to our accepted methodologies for assessing water quality data and is the most often used statistic. Regulation No. 31 at section 31.8(2)(a)(i) provides for the accepted assessment statistics to measure existing quality:

"Existing quality" shall be the 85th percentile of the data for un-ionized ammonia, nitrate, and dissolved metals, the 50th percentile for total recoverable metals, the 15th percentile for dissolved oxygen, the geometric mean for fecal coliform and E. coli, and the range between the 15th and 85th percentiles for pH.

Q33: How do you apply the 10% bioaccumulative toxic pollutants test?

A33: This test applies only to bioaccumulative toxic pollutants, which are listed on page 17 of this guidance document. If the pollutant is a bioaccumulative toxic, then the BWQ, BWQ Load, New Load and Threshold Load (TL) must be calculated. The BWQ Load (if not already determined) is calculated by multiplying the BWQ by the baseline low flow. The New Load is calculated by multiplying the new WQBEL by the new design flow. The TL is calculated as 0.1 multiplied by the BWQ Load (minus any other discharge loads impacting the portion of the segment). If the New Load is greater than the TL, then there is a significant impact. If the TL is acceptable to the permittee then this load would be considered to result in insignificant impacts.

In either case, the additional three significance tests must be conducted. The difference is which load proceeds through the tests. See the significance tests flow charts (Figures 3 and 4) presented in this guidance document. The confusing coordination with this test and the other three is when the permittee chooses to reject the TL and continue with the alternatives analysis. In this case, the permittee will proceed to alternatives but must still conduct the other three tests. If the concentration test results in a more restrictive limit as well, then the permittee may choose to pursue the alternatives analysis to demonstrate the need to discharge beyond the TL and the ADBAC.

Q34: How are ADBACs determined where an additional discharge is located in the mixing zone of the subject discharge?

A34: Multiple discharges are a very site-specific situation and will be handled on a case-by-case basis. This issue is not specific to antidegradation and is more of a WQBEL development issue for all permits, with the exception of establishment of the BWQ. In the case of multiple discharges within a mixing zone area, downstream water quality may not be representative of the BWQ. If all the discharges were permitted and in place on September 30, 2000 then the downstream water quality may be representative of the BWQ; however, if one or more discharges weren't permitted or weren't in place on September 30, 2000 then the downstream water quality may not be representative. In that case the BWQ may need to be calculated based on the upstream water quality and the permitted and/or in-place discharges quality. If the additional discharge(s) is not permitted, the BWQ will be calculated for the subject discharge (as described above) and the additional discharge will be evaluated for permitting.

Q35: How are the ADBACs determined if the additional discharge is a new or increased discharge after September 30, 2000 and the SCT has already been allocated?

A35: If the additional discharge is downstream of a discharge where the SCT has already been allocated, then the additional discharge permittee may (1) elect to accept the ADBACs set equal to the SCT; (2) negotiate reallocated waste loads with adjacent dischargers; (3) propose a control regulation to the Commission; or (4) pursue the alternatives analysis (see Answer 40 and Mixing Zone Guidance about overlapping mixing zones, WQCD 2001).

Q36: What if a proposed new or increased discharge is located on a Use-Protected segment, but water quality would also be affected in a downstream segment that is reviewable?

A36: If a downstream reviewable segment would also be impacted by the new or increased discharge, then the significance tests would have to be conducted to determine if the impact would result in significant degradation.

Q37: For the new or increased water quality impacts screening test for renewal permits, how does the option work of accepting the Non-Impact Limit?

A37: If the new load is greater than the old load; and the result of retaining the old load with the new design flow is not greater than the existing limit, then there is an option to accept the old load with the new design flow, otherwise known as the Non-Impact Limit. Accepting the Non-Impact Limit would not result in an increased water quality impact (no increase in concentration or load); therefore, no antidegradation review would be required. The Non-Impact Limit would move forward in the permitting process without an antidegradation-based limit.

Note that the new design flow always moves forward in the permitting process in addition to the concentration limits. If at any time, a permittee requests a different new design flow then they must begin the permits process again from step one which consists of a revised application and re-submittal. Note also, that the scenario of the result of dividing the old load by the new design flow being greater than the existing limit occurs when the new design flow is less than the existing design flow. This is not expected to happen very often. Most scenarios of the new load exceeding the old load will result in the option to accept the Non-Impact Limit as a potential new permit limit. If accepted, the Non-Impact Limit would replace the new potential water quality-based effluent limit as a potential limit as the permits process moves forward.

Q38: What do the notations on the flow charts mean and are there examples of the antidegradation calculations provided in this guidance?

A38: The flow charts are guides through the antidegradation review process. The results of different stages of the process include 1) antidegradation review is not required (or no further review required), 2) antidegradation review is not required based on the acceptance of certain limits, 3) further antidegradation review is required by proceeding to the significance tests, 4) antidegradation-based limits not required due to the impact resulting in insignificant degradation, 5) antidegradation review ends due to acceptance of antidegradation-based limits set at the levels considered to result in insignificant degradation, 6) further antidegradation review is required by proceeding to the remainder of the review including the alternatives analysis, and 7) antidegradation review ends with antidegradation-based limits established as a result of the alternatives analysis. Examples of the calculations referred to in the flow charts and described in this document are provided as an attachment to this guidance.

The antidegradation process endpoints are detailed on the flow charts as highlighted ovals. The ovals usually contain text that indicates something close to “No ADBEL, Use WQBEL_{new}” or “Use ADBEL = ADBAC.” Any oval with “No AD Review Required” means that the antidegradation process doesn’t apply to impacts on that waterbody or that there is no new or increased impact (such as in cases 1 and 2 above, respectively). Any oval with “No ADBEL” means that the antidegradation process is over and no antidegradation-based limits are required (such as in cases 2 and 4 above). Any oval with “Use WQBEL_{new}” or “Use Existing Limit” or “Use Non-Impact Limit” means that limit specified would be the limit to move forward from the antidegradation review process to the remainder of the permits process. Any oval with “Use ADBEL = ‘x’” means that an antidegradation-based limit is required and will be set at the value “x” and will move forward through the permits process along with the WQBEL_{new} (such as in cases 5 and 7 above).

Any downward pointing pentagons with “Proceed to Significance Tests” means that Figures 3 or 4 should be followed next (such as in case 3 above). Downward pointing pentagons with “Proceed to AA for ADBEL > ‘y’” means the remainder of the antidegradation review must be conducted (as broadly outlined on the bottom of Figure 1) including the alternatives analysis to pursue an antidegradation-based limit greater than the value “y” that would result in insignificant degradation (such as in case 6 above).

Step numbers are provided in part on Figures 2 – 4 to match the text in the document. Figure 1 provides an overview of the entire process. Figure 2 is a detailed schematic representing the first diamond on Figure 1. Figures 3 and 4 are detailed schematics representing the second diamond on Figure 1. Notations are provided on Figure 3 as to which significance tests the diamonds relate to.

Q39: Whom can I contact for questions and copies of future versions of this guidance?

A39: This document was prepared by the Assessment Unit of the Colorado Department of Public Health and Environment's Water Quality Control Division. Future versions of the document will be released on an as-needed basis and will be made available electronically on the Division's website (www.cdphe.state.co.us/wq/wqhom.asp). Follow the links to the Assessment Unit page (currently under construction as of the release of Version 1.0 of this guidance). Questions on this guidance should be directed to Assessment Unit staff. Questions related to permits should be directed to Permits Unit staff. Phone Inquiries may be made through the Division's main number at (303) 692-3500.

Q40: What constitutes an alternatives analysis?

A40: The Basic Standards (Regulation No. 31) provides guidance on alternatives analyses at section 31.8(3)(d).

Excerpt from 31.8(3)(d)

(d) Necessity of Degradation Determination

If a determination has been made in accordance with section 31.8(3)(c) that a proposed regulated activity is likely to result in significant degradation of reviewable waters, a determination shall be made pursuant to this section whether the degradation is necessary to accommodate important economic or social development in the area in which the waters are located. The following provisions shall apply to this determination:

- (i) The "area in which the waters are located" shall be determined from the facts on a case-by-case basis. The area shall include all areas directly impacted by the proposed regulated activity.
- (ii) A determination shall be made from the facts on a case-by-case basis whether the proposed regulated activity is important economic or social development. If the activity proponent submits evidence that the regulated activity is important development, it shall be presumed important unless information to the contrary is submitted in the public review process. The determination shall take into account information received during the public comment period and shall give substantial weight to any applicable determinations by local governments or land use planning authorities.
- (iii) If the proposed regulated activity is determined to be important economic or social development, a determination shall be made whether the degradation that would result from such regulated activity is necessary to accommodate that development. The degradation shall be considered necessary if there are no water quality control alternatives available that (A) would result in no degradation or less degradation of the state waters and (B) are determined to be economically, environmentally, and technologically reasonable.

This determination shall be based on an assessment of whether such alternatives are available, based upon a reasonable level of analysis by the project proponent, consistent with accepted engineering practice, and any information submitted by the public or which is otherwise available. The assessment shall address practical water quality control technologies, the feasibility and availability of which has been demonstrated under field conditions similar to those of the activity under review. The scope of alternatives considered shall be limited to those that would accomplish the proposed regulated activity's purpose. Any alternatives that would be inconsistent with section 25-8-104 of the Water Quality Control Act shall not be considered available alternatives.

In determining the economic reasonableness of any less-degrading water quality control alternatives, the Division may take into consideration any relevant factors, including but not limited to the following, if applicable:

- (A) Whether the costs of the alternative significantly exceed the costs of the proposal;
- (B) For publicly owned treatment works (POTWs) or public water supply projects, whether user charges resulting from the alternative would significantly exceed user charges for similarly situated POTWs or public water supply projects;
- (C) For private industry, whether the alternative would have a significant adverse effect upon the project's profitability or competitive position (if the project proponent chooses to provide such information);
- (D) For any dischargers, whether treatment costs resulting from the alternative would significantly exceed treatment costs for any similar existing dischargers on the segment in question.
- (E) The relative, long-term, energy costs and commitments and availability of energy conservation alternatives.

Excerpt from 31.23 (A)(5)(e) STATEMENT OF BASIS, SPECIFIC STATUTORY AUTHORITY AND PURPOSE (1988 REVISIONS-ANTIDEGRADATION)

e. "Important economic or social development"

Implementation of the antidegradation rule requires some determination of whether a particular proposed activity is important economic or social development. The Commission intends that the case-by-case determinations regarding this issue will take into account all available information and will recognize that the primary responsibilities and expertise of the Commission and the Division are not in making land use decisions that assess the importance of specific development. While local land use decisions would not be binding on the antidegradation determination, the Commission believes that such decisions should be given substantial weight.

The Commission also intends that the determination of importance will be based on the net impacts of a project, after considering both positive and negative impacts. The Commission anticipates that in many instances if there is no information presented to the contrary, the Division will appropriately assume that the proposed development in question is "important." In specific instances, public comment could lead to a contrary conclusion. For example, the people in the area of a proposed development could feel that the jobs and other benefits associated with the development are not important to them compared to the importance of protecting the quality of a local water resource.

While acknowledging the primary local role in land use planning, the Commission notes that in some circumstances there may be a dispute regarding which local governmental entity's land use

determinations should take precedence. That issue is beyond the scope of these regulations and no attempt is made to resolve it here. Rather, based on all the evidence submitted the Division and, if necessary, the Commission will simply have to decide on a case-by-case basis which local land use determinations are "applicable".

f. Necessity of degradation

The determination whether degradation is necessary is to be made by examining whether any less-degrading alternatives are available. The Commission has attempted to circumscribe the range of alternatives considered in several respects. First, alternatives must be economically, environmentally and technologically reasonable. The Commission does not intend by this regulation to force the application of untested new technologies. Second, available alternatives are limited to those that would accomplish the proposed activity's purpose. So long as a project has passed the "important development" test and reached this stage of the review, the "no-action" alternative (i.e. not proceeding with the project) will not be considered an available alternative. Third, in order to avoid undue impact on water rights, the Commission has provided that any alternative that would be inconsistent with the provisions of section 25-8-104 will not be considered "available".

Finally, the Commission has chosen to focus on available "water quality control alternatives." While this term is not specifically defined in the regulation the intent is to focus on alternatives directly related to protecting water quality--e.g. different treatment techniques, different discharge locations, applications of additional best management practices, or process changes that improve discharge quality. It is not the Commission's intention that activity proponents would have to examine completely different types of projects than those originally proposed.

Substantial concern was expressed in comments submitted regarding the additional burden placed on project proponents by establishing an alternatives analysis requirement. The Commission does not intend that this requirement would constitute a major additional burden in most instances. Alternatives analysis is standard engineering practice when planning a new project. New domestic dischargers already are required to undertake an alternatives analysis in the site application process. Projects that require a section 404 permit are already subject to Corps of Engineers and EPA requirements to consider alternatives (see, e.g., 33 CFR section 320.4(a)(2)(ii) and 40 CFR section 230.10(a)). Projects subject to federal NEPA requirements already are faced with an alternatives analysis requirement that goes substantially beyond that required here. The Commission intends that the alternatives analysis for antidegradation review purposes should be coordinated with any such other reviews to the extent possible to avoid unnecessary duplication. So long as a reasonable effort has been made to assess less-degrading alternatives, in many circumstances these other reviews may be sufficient to satisfy the antidegradation review requirements.

The Commission also has included in this section a general list of factors that the Division is directed to consider in making case-by-case determinations whether potential alternatives are economically reasonable. The proposal for this hearing included a more specific test of economic reasonableness. Based on the comments submitted, it appears that it is not possible at this time to formulate one simple test that will yield an appropriate determination in all circumstances. Therefore, the Commission has decided to retain flexibility, while providing some guidance as to the criteria it will apply. If experience demonstrates that more specific criteria are workable and helpful, the regulation can be revised at a later date. Although the Division does not maintain an economist on its staff, the Commission notes that the Division has prior experience with implementing an economic reasonableness concept, especially in the context of certain discharge permit variances, which are no longer available following the adoption of Senate Bill 83 in 1985.

STATE OF COLORADO

Bill Owens, Governor
Jane E. Norton, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
TDD Line (303) 691-7700
Located in Glendale, Colorado

Laboratory and Radiation Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

<http://www.cdphe.state.co.us>



Colorado Department
of Public Health
and Environment

MEMORANDUM

To: Persons interested in Water Quality Control Division's Antidegradation Significance Determination Guidance
From: Water Quality Control Division, Assessment Unit Staff
Date: April 23, 2002
Subject: First Update to Guidance, Version 1.0, December 2001

The Colorado Water Quality Control Division (WQCD) released Version 1.0 of the Antidegradation Significance Determination Guidance in December of 2001. As issues come to light, updates to the Guidance will be provided via memorandum and posted on the Assessment Unit website. Significant changes or additions to the Guidance will be incorporated in the release of subsequent versions. Implementation of a portion of the "New or increased water quality impacts screening test" has led to the need to make several changes and clarifications to the Guidance. The following describes the first update of changes and clarifications to Version 1.0 of the Guidance.

Setting the Value of Implicit Limits

Changes to the Guidance are necessary in regards to the "New or increased water quality impacts screening test" where the Division may recognize implicit permit limits for a permitted discharge with pollutants not explicitly limited in the current permit. This is addressed in the Guidance in Section VI, D on pages 14 and 15; in Figure 2 on page 16; and in Section VII, Question and Answer 27 on page 33.

One result of the screening test is the option to accept the "existing limit" in which case an antidegradation review would not apply and the existing limit would be retained in the next permit. It was the Division's intent that implicit limits would also be recognized in place of the "existing limit" in that process. If as a result of the screening test, the option to accept the "existing limit" was selected, then the Division intended to require an explicit limit in place of the implicit limit for the next permit.

Version 1.0 of the Guidance indicates the Division will use the average effluent concentration to determine the implicitly authorized discharge concentration (or implicit limit). If the Division used the average effluent concentration to determine the implicit limit then accepting the "existing limit" would result in a permit limit based on the average effluent concentration discharged during the previous two years. This would require the permittee to adjust their effluent concentration approximately half the time to meet the new effluent limit. The intent of the option to accept the "existing limit" was for permittees to maintain the status quo for their discharge. Using an average-based implicit limit penalizes the permittee lacking explicit permit limits in comparison to the permittee with explicit limits.

After careful consideration of this issue, the Division has decided to modify its approach on the value to use for implicit limits when recognized. Instead of using the average effluent concentration, the Division will use the maximum (of the previous two years of data). The maximum is more consistent with discharges up to an effluent limit and discharges up to design capacity. The following changes to Version 1.0 incorporate this change in approach, and clarify the Division's intent to include an explicit limit in the next permit where an implicit limit is accepted as an "existing limit".

Page 15, last paragraph, fourth sentence (Section VI, D) – change the word 'average' to 'maximum'.

Page 15, last paragraph (Section VI, D) – add the following sentence to the end of the paragraph: "In other words, in the steps above and the associated flowchart on Figure 2, the implicitly authorized discharge concentration would be used in place of 'Existing Limit'."

Page 15 (Section VI, D) – add the following paragraph after the last paragraph: "Where an implicit limit is recognized, an explicit limit will be included in the next permit based on the result of the process above and the associated flowchart. If the option is presented and accepted of retaining the "Existing Limit" then the implicit limit (maximum effluent concentration) will be included as an explicit limit in the next permit. If the result of the process is acceptance of the Non-Impact Limit or the use of the new WQBEL then these limits would become explicit limits in the next permit. If the process results in proceeding to the significance tests then the new WQBEL would become an explicit limit in the next permit along with a potential antidegradation-based limit. Limits will still be evaluated based on a reasonable potential analysis prior to inclusion in a permit."

Page 16, Figure 2, top right box of flowchart (Section VI, D) – change the word 'average' to 'maximum'.

Page 33, answer 27, 1st paragraph, 3rd sentence (Section VII, Q&A 27) – change the word 'limit' to 'level' for further clarification.

Page 33, answer 27, 3rd paragraph (Section VII, Q&A 27) – change the word 'mean' to 'maximum'. Add the following sentences to the end of the paragraph: "Where an implicit waste load allocation is recognized, the implicit limit (maximum effluent concentration) is used in place of the 'Existing Limit' in the Figure 2 flowchart (page 16). An explicit limit will then be given in the new permit based on the result of the flowchart process: either the maximum effluent concentration, new WQBEL or Non-Impact Limit (See Section VI, D on pages 14-16). Limits will still be evaluated based on a reasonable potential analysis prior to inclusion in a permit."

Clarifications

In addition to the changes mentioned above, several clarifications are made as indicated below with three new Questions and Answers; and several general revisions to existing language.

Q41: How is the BWQ established for Lakes?

A41: The BWQ is established in the same manner for lakes as it is for streams. The BWQ (as defined in Section VI, A on page 10) is the ambient condition of the water quality as of September 30, 2000. It is also the fully mixed condition below a discharge that was in place prior to September 30, 2000. When calculating BWQ with a discharge in place prior to September 30, 2000, a low flow (or dilution) value is needed. The value will be determined based on the results of the required mixing zone analysis (the Basic Standards at Section 31.10(4)(b)(i) and the WQCD's

Colorado Mixing Zone Implementation Guidance, April 2002 require mixing zone studies for all discharges to lakes). Necessary adjustments for the baseline dilution condition of September 30, 2000 may be made to the current mixing zone analysis results. See also Q&A number 42 for more information on mixing zones.

Q42: How does antidegradation correspond with mixing zones?

A42: The regulations regarding mixing zones are included in the Basic Standards at Section 31.10 and state that antidegradation does not apply within the mixing zone. Therefore, as standards must be met at the edge of the mixing zone, so must the SCT for reviewable waterbodies. Further guidance on mixing zones is included in the WQCD's Colorado Mixing Zone Implementation Guidance, dated April 2002.

Q43: What constitutes a new discharge?

A43: A new discharge would include existing effluent proposed for discharge to a location outside of the mixing zone of the existing discharge; effluent proposed for discharge from an additional outfall; existing effluent to which new pollutants are added; or effluent proposed for discharge from a new facility (except for replacement facilities with effluent proposed for discharge to the same location).

Other miscellaneous corrections

Page 13, Figure 1. Antidegradation Review Process Overview – A change will be made in the next version of the Guidance to indicate that a “UP” designation does not automatically mean that antidegradation is not required (see also Q&A number 36). An antidegradation review is required for impacts to ‘reviewable’ waterbodies; therefore, there could be an impact to a use protected waterbody which also impacts a reviewable waterbody. A common example of this is a discharge to a tributary just above its confluence with a mainstem. The tributary could be designated as use protected and the mainstem could be ‘reviewable’ with the discharge affecting both the tributary and mainstem segments. The change to Figure 1 would be made to ensure consistency with Q&A number 36.

Page 16, Figure 2. Screening Process – Is there a New or Increased WQ Impact? – A change will be made in the next version of the Guidance to the diamond just below the Step 4 box. The diamond currently reads “Is $\text{Load}_{\text{old}}/\text{DF}_{\text{new}} > \text{Existing Limit?}$ ” If the design flow does not change between permit cycles then the $\text{DF}_{\text{old}} = \text{DF}_{\text{new}}$ and the result of $\text{Load}_{\text{old}}/\text{DF}_{\text{new}}$ is $\text{Load}_{\text{old}}/\text{DF}_{\text{old}}$. Meanwhile, $\text{Load}_{\text{old}}/\text{DF}_{\text{old}}$ equals the Existing Limit. So, if the design flow doesn't change, then the result becomes “Existing Limit > Existing Limit?” and leads to Step 4b. The results of Steps 4a and 4b would then be the same since under Step 4b, the Non-Impact Limit would be the same as the Existing Limit. To avoid confusion, the diamond will be changed to read “Is $\text{Load}_{\text{old}}/\text{DF}_{\text{new}} > \text{or} = \text{Existing Limit?}$ ” and the associated text in Section VI, D will be updated to reflect the change in the flowchart.

Page 27, Question and Answer No. 10 – Change first sentence of answer as follows: “To determine the baseline water quality, obtain data from a water quality station located below a fully mixed condition ~~downstream of~~ within the segment portion in question.”

Page 29, Question and Answer No. 16 – Change second sentence of second paragraph as follows: “The BWQ is determined as indicated in Q&A numbers 9, 10 or 12. If the BWQ must be estimated for a discharge in place prior to September 30, 2000, where representative downstream data isn’t available, then the following approach will be used for determining the BWQ for ammonia which replaces the approach set out in Q&A number 11. ~~by entering t~~The mean monthly discharge concentrations of total ammonia and the mean monthly discharge flows are entered into the model.”

Page 34, Question and Answer No. 30 – Change the second sentence of answer as follows: “The ADBEL is implemented in permits as a two-year moving average; therefore, seasonal or monthly limits are generally not an option. ADBELs for ammonia may provide an exception as explained in Q&A number 16.”

Questions regarding these changes should be directed to the Assessment Unit staff at (303) 692-3500. This update will be posted along with the Guidance on the Assessment Unit website at http://www.cdphe.state.co.us/wq/Assessment/assessment_practices_and_methods.htm